ELECTRICAL TIMES

THURSDAY
30 OCT.
1952
NINEPENCE

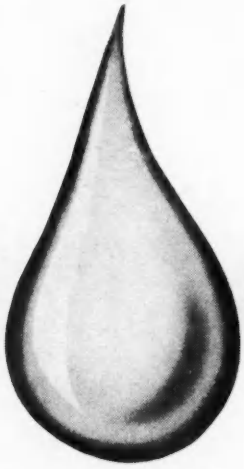
REMEMBER POPPY DAY

HENLEY

Specialists in Super-Tension Cable Technique

We are able to install complete super-tension schemes, including joints, terminations, etc., for all three of the principal underground cable systems: Gas Cushion, Oil Filled and Solid Type.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN LONDON E.C.1

Bandit  at bay!

Public Enemy No. 1 so far as the electrical engineer is concerned is moisture, and much has been spoken and written about this menace. The only observation we would make is that one of the grades of DELARON Laminated Plastic has such a low water absorption figure that we sometimes have difficulty in measuring it.

For example, a block of DELARON Grade P.E. 1 size $1\frac{1}{2}''$x$1\frac{1}{2}''$x$\frac{1}{8}''$ thick weighs approximately 6.100 grammes. If you immerse it in water for twenty-four hours and re-weigh it, you will find that it then weighs approximately 6.106 grammes, an increase of 6 mgms., representing an increase of less than 0.1% by weight.*

DELARON insulation may not be the final answer to the problem of moisture and electrical circuits, but its use does give the circuit the best chance of operating at an optimum efficiency.

Delaron
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MADE BY
DE LA RUE

Please write for the Delaron Data Book which gives full details of our complete range :

THOMAS DE LA RUE AND COMPANY LIMITED (Plastics Group)

IMPERIAL HOUSE, 84-86 REGENT STREET, LONDON, W.1. TELEPHONE: REGENT 2901

Precision in process control

The Ignitron is designed for precision control of processes involving the use of comparatively low voltages and high currents — for example, resistance welding and X-Ray exposure control. It exhibits some important advantages over other methods; the ignitron combines the precision and freedom from mechanical problems of the thermionic valve with the robustness of the contactor; it is compact, moderate in weight and has a long life. 'ENGLISH ELECTRIC' Ignitrons are made in a range of standard sizes, interchangeable with all other types in common use. They can be water-cooled and are suitable for line voltages of 250-600 volts.

'ENGLISH ELECTRIC' ignitrons

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Rectifier Sub-station Department, Stafford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

IG.1 A

EAGLE TOWER WAGONS

EAGLE Tower Wagons have many special features including: ☆ Power hydraulic elevating gear with safety device, which is simple, efficient and foolproof. ☆ Coach-built cabs and workshops built to individual requirements. ☆ Special insulated mountings for working platform if specified. ☆ Tower and cabs designed for any make of chassis. ☆ Two, three and four-stage towers to suit requirements. ☆ Speedy and silent in operation. ☆ When sending your enquiry for an EAGLE Tower Wagon please specify extended height from the ground to top platform and overall lowered height required.

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Municipal and Transport Engineers,
WARWICK ENGLAND
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The FASTENER with ENDLESS APPLICATIONS
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SPECIAL FASTENERS TO SUIT CUSTOMERS' REQUIREMENTS
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Sliding Rheostats for all purposes

CRESSALL Sliding Rheostats are manufactured in an immense variety of types and sizes to meet every known requirement. Every CRESSALL rheostat is of sound design and incorporates the best possible workmanship — yet prices are competitive

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THE CRESSALL MANUFACTURING CO. LTD.
TOWER STREET BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 lines)
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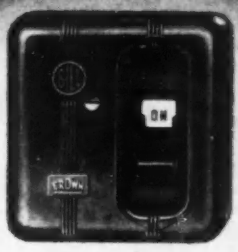
You cannot buy better gear

CROWN



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DESIGNED FOR SP/N CIRCUITS.
SLOW BREAK A.C. SWITCH.
OPERATED FROM THE FRONT.
ALL-INSULATED AND METAL CLAD.
FOR 15 & 30 AMPERES 250 VOLTS.

DETAILS ON REQUEST.

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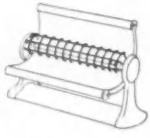
THE **HOTSPUR**

This has always been a very popular fire because of its sound construction and efficiency. The highly polished reflector fits snugly into the well-proportioned body, and is set at just the right angle for projecting intense radiant heat over a wide area. It is finished in Silver, Silver Bronze or Silver Green. Prices (inc. tax): 1 kw. model £4. 6. 9. 2 kw. model £5. 18. 0.

THE **SOLRAY**

Universally acknowledged to be the most attractive fire of its kind yet produced. The highly-polished reflector is adjustable to enable the heat rays to be directed in any desired angle. The Solray can also be mounted on the wall. Price (inc. tax): 1 kw. model £6. 13. 8. 2 kw. model £8. 1. 5.



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This useful fire heats a room thoroughly and at the same time will keep plates or food warm on its flat top. Economical to use and economical in price, the 1 kw. model costs 47/9 and the 2 kw. model 76/5 (inc. tax).

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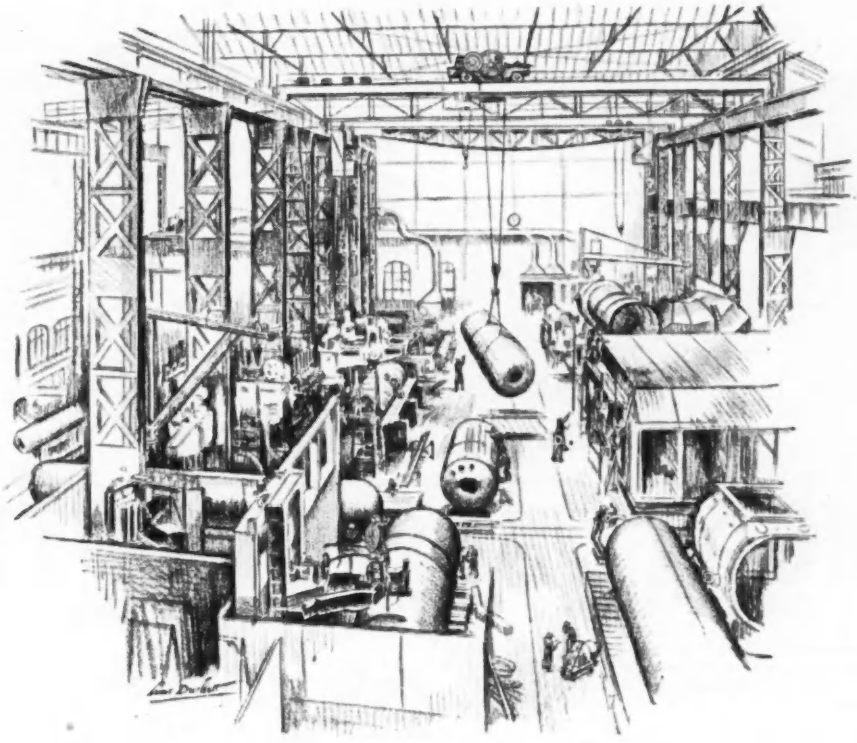


WATER TUBE BOILERS

YARROW & CO LTD SCOTSTOUN GLASGOW

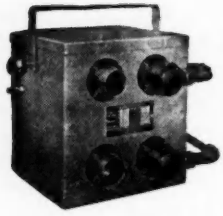
TRANSFORMERS

From 8 V.A. to 100 k.V.A.

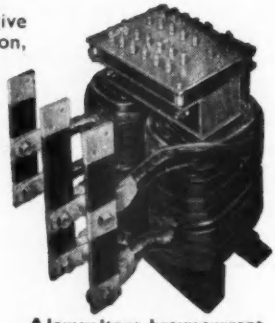
HEAYBERD Transformers are designed to give the utmost reliability and economy in operation, fully in accordance with the relevant British Standard Specifications.

We shall be pleased to quote for open, enclosed and oil-insulated transformers to suit your particular purpose.

Write for List 1044.



Portable Transformer
Primary: 250v. 50 Cycles
Secondary: 25v. 250V.A.



A low voltage, heavy current transformer with an output of 10 volts. 800 amps.

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NON-METALLIC CONDUIT AND FITTINGS

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An identical system to steel conduit but with these advantages:

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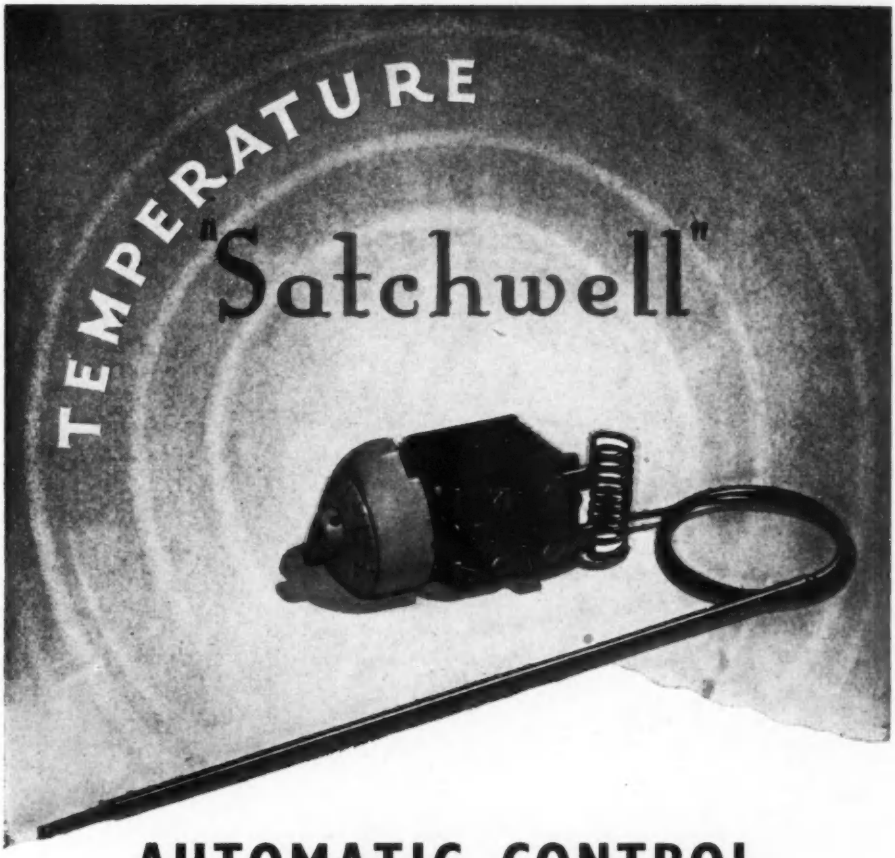

AUTOMATIC CONTROL

This picture shows one of a range of hydraulically operated electric cooker oven thermostats, type "HCS", which we have developed.

These thermostats are supplied in a number of different switch arrangements to satisfy the control demand of almost any type of domestic electric oven, and we shall be very pleased to send you a copy of list 104 which describes these instruments in detail.

THE RHEOSTATIC COMPANY LIMITED

Telephone: SLOUGH 23311-6

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Telegrams: "RESISTANCE, SLOUGH"

ELECTRIC CONSTRUCTION BOOSTS GAS AT BIRMINGHAM

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WEST MIDLANDS GAS BOARD
J. E. WAKEFORD, Esq.
M.B.E., M.Inst. Gas E., M.Inst.F.
Divisional Manager.

This Electric Construction motor driving a booster at the Washwood Heath plant of the West Midland Gas Board (Birmingham District) is a 460 B.H.P. fully compensated D.C. machine with a speed range of 750/1750 R.P.M. It is pressure-ventilated from separate motor-driven fans.
The control gear for this motor and the rectifier which supplies it are of E.C.C. make.

E C C

THE ELECTRIC CONSTRUCTION Co LTD
WOLVERHAMPTON
Telephone 21455 (7 lines)

London Office: "Bushbury House" 57 Buckingham Gate, London S.W.1
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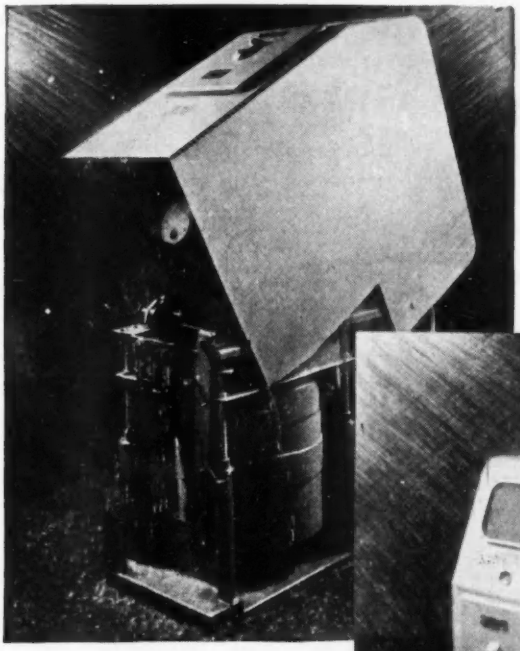
Never mind the weather –

never mind the rain!



IVIO OUTDOOR SWITCHGEAR

for all

climatic conditions

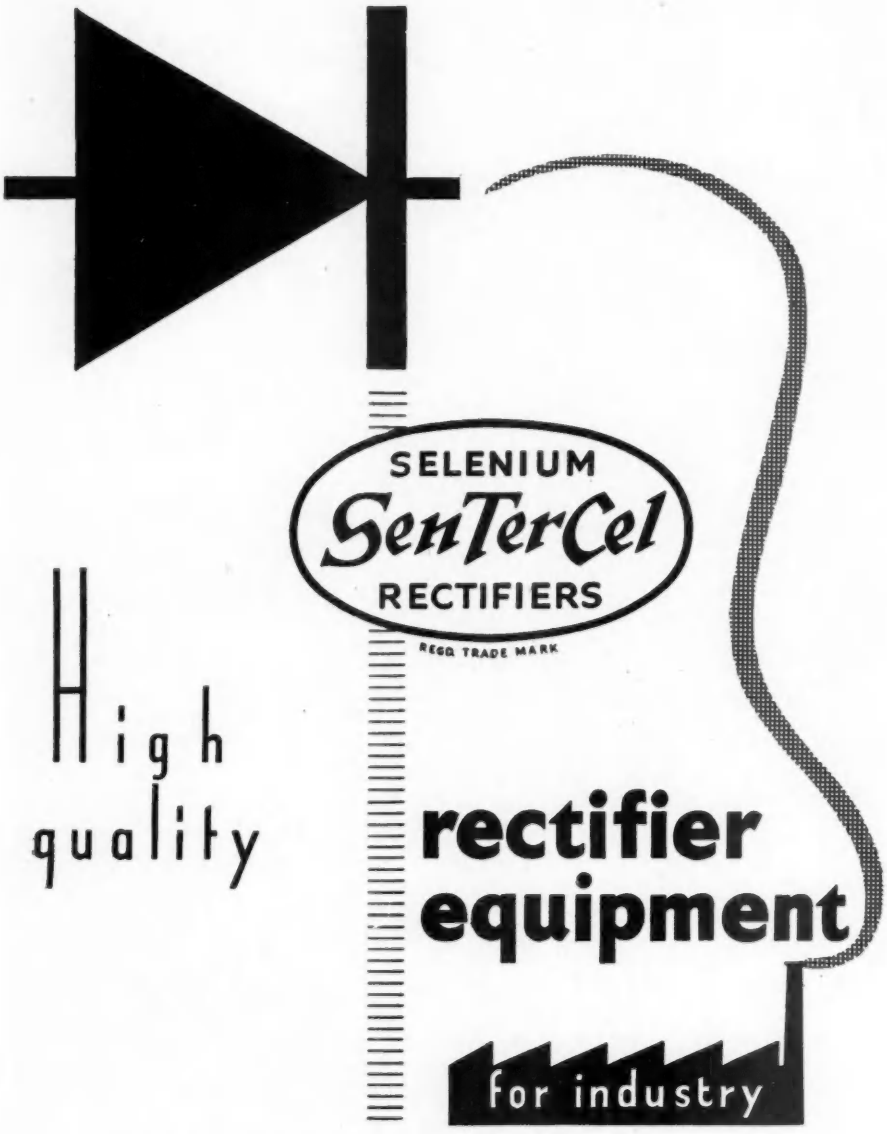
(ALSO FOR INDOOR USE)

Actual photographs of IVIO Switchgear taken whilst alive at 11 kV under Tropical Storm Test of 54 ins. per hour in our Climatic Laboratory. Ambient temperature 55° C. and 100% relative humidity before storm, dropping to 10° C. after 15 mins. of storm.

YORKSHIRE SWITCHGEAR

& ENGINEERING CO. LTD. LEEDS & LONDON

ASSOCIATED WITH ELECTRO MECHANICAL MFG. CO. LTD., SCARBOROUGH



Standard Telephones and Cables Limited

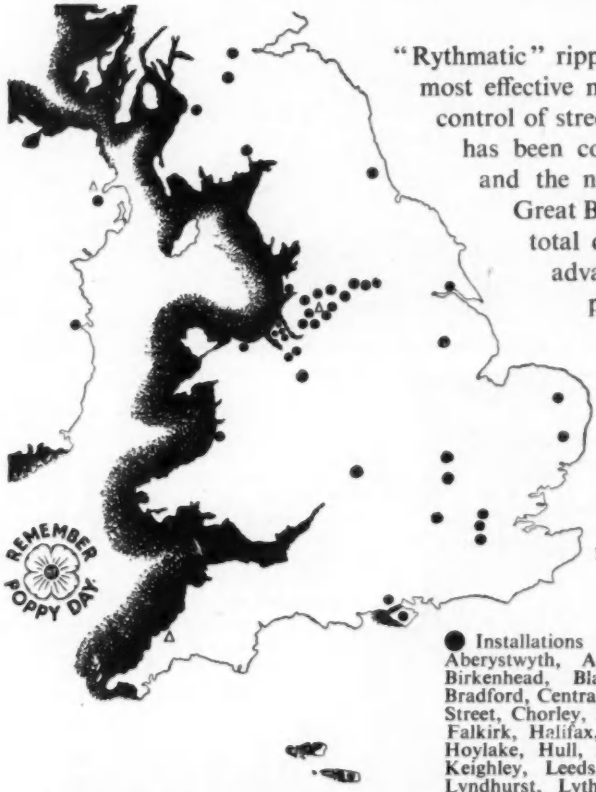
Registered Office: Connaught House, Aldwych, London, WC2

RECTIFIER DIVISION: Warwick Road, Boreham Wood, Herts

Telephone: Elstree 2401 Telegrams: Sentercel Borehamwood

The people who know most about ripple control — SPECIFY RYTHMATIC*

FOR STREET LIGHTING CONTROL



"Rythmatic" ripple control has proved the most effective method for the centralized control of street lighting. Its application has been continuous and widespread and the number of installations in Great Britain exceed the combined total of all other systems. The advantage of the "Rythmatic" principle is that a single frequency only provides the required number of signals. Injection equipment and control relays are simple in design, resulting in negligible maintenance requirements.

● Installations are already operating at Aberystwyth, Ayrshire, Banstead, Bedford, Birkenhead, Blackburn, Bletchley, Bolton, Bradford, Central London, Chester, Chester-le-Street, Chorley, Dublin, Dumfries, Dunstable, Falkirk, Halifax, Hawarden, High Wycombe, Hoylake, Hull, Isle of Wight, Jersey (C.I.), Keighley, Leeds, Leyton, Lincoln, Lisburn, Lyndhurst, Lytham St. Annes, Motherwell, Nelson, Newton-le-Willows, Norwich, Port Sunlight, Radcliffe, Rhyl, St. Helens, Wallasey, Wigan, Wolverton.

△ *In process of manufacture for Belfast, Rawtenstall and West Cornwall.*

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Telegrams: Strowger, Estrand, London. Strowger Works, Liverpool, 7.

★ 'RYTHMATIC' *is the registered trade mark of Automatic Telephone & Electric Co. Ltd.*

A.3523-CX23

Introducing the new

DORMAN DIOPAL

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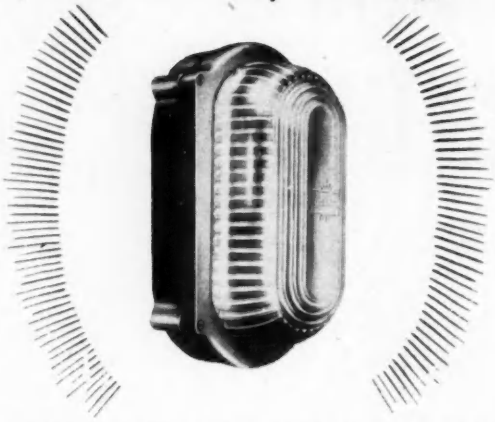

Joins the "Diolux" and "Diolume" to complete the Dorman range of industrial prismatic lighting fittings.

THE COMPETITIVE FITTING AT **29/-** LIST

UP TO 100 W

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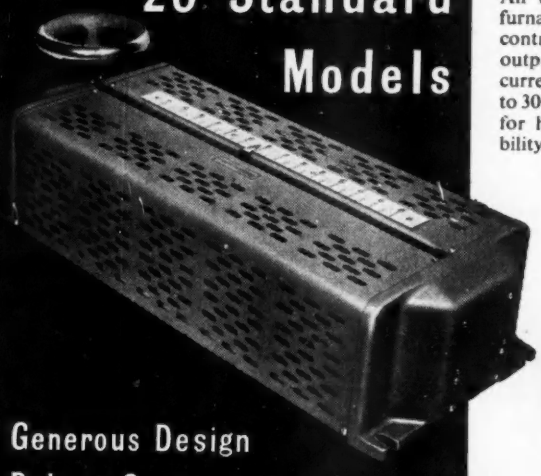
26 Standard Models



Generous Design
Robust Construction
Rugged Self-lubricating Brushes

All types of A.C. apparatus — motors, furnaces, rectifiers, transformers — can be controlled by a single Regavolt whose output can be set, regardless of the load current, precisely at any voltage from 0 to 30% above the supply. Its rugged design for heavy industrial duty ensures reliability under severe working conditions.

Special designs can be made for incorporation in your own apparatus in addition to the wide range of single, 3 phase, hand and motor driven models listed in our catalogue No. 3121.

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REGULATING TRANSFORMER

THE BRITISH ELECTRIC RESISTANCE CO. LTD.

Specialists in the control of current and voltage for more than 25 years.

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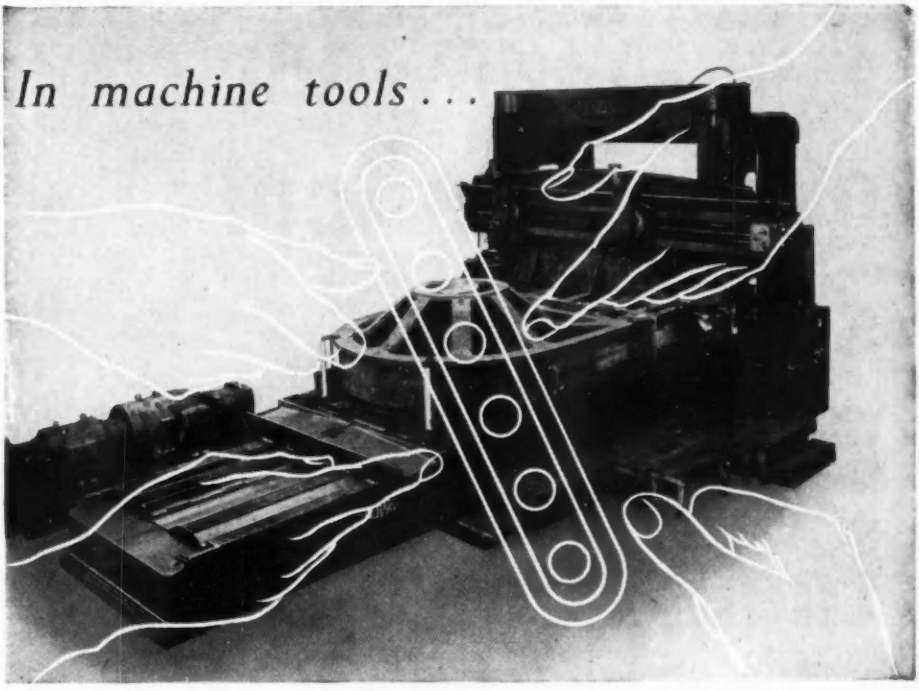
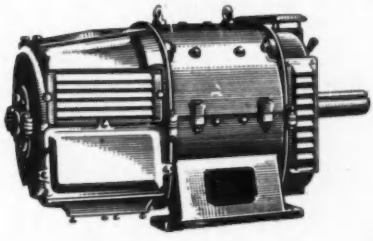


Push Buttons for Productivity

Even in the up-to-date production shop there is room for reducing time-wasting manual labour by thoughtfully applied electrical drives. In the M-V Motor Department are engineers who really understand the electrical problems of the machine-tool industry and their advice is available at the drawing board stage for new machines or on the conversion of existing equipment.

A typical Metrovick Type "Q" Direct Current Motor.



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METROVICK *Motors for all Industrial Drives*

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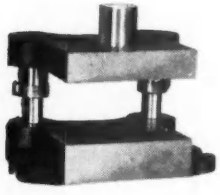
– print it very small – often better



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"Successful burial!"

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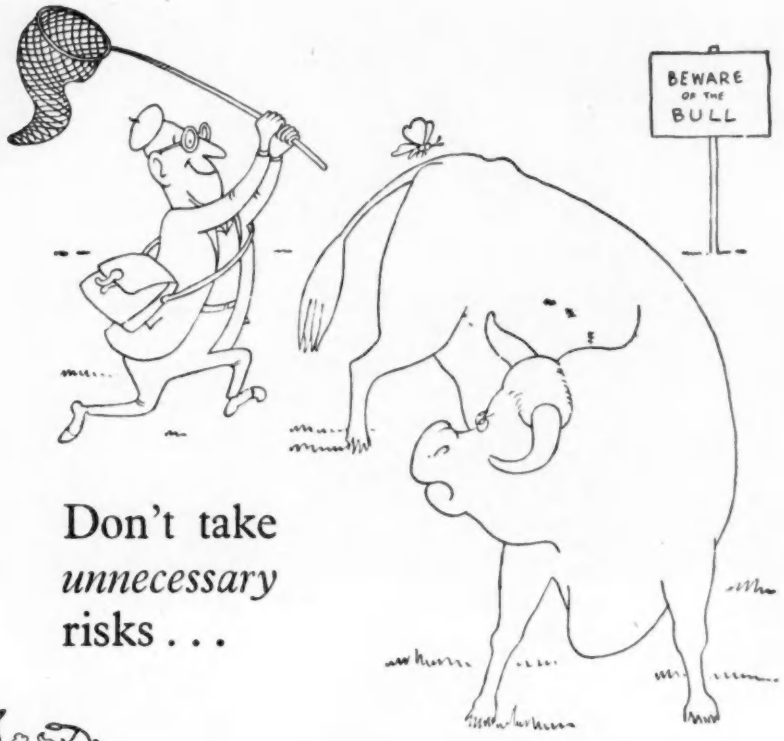
To-day BICC make cables (including Oil Filled and Impregnated Pressure types) for all working voltages up to 275kV. Meanwhile we are developing cables of even greater capacity to meet the increasing power demands of tomorrow.

B.I. Callender's HIGH VOLTAGE CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



Don't take *unnecessary* risks . . .

IT looks a 'natural'—a rare and golden opportunity; but see the trouble it causes this near-sighted naturalist. Yet it's so *easy* to be misled by appearances—every day someone or other is finding himself on the horns of a dilemma through leaping before he looks. Not only light-hearted butterfly hunters, but hard-headed business men—it's just as easy to be led astray in the factory as in the field. You take a leap in the dark, for instance, every time you buy important components of uncertain quality. And speaking of leaps, let's talk about Springs . . .

WARNING TO MANUFACTURERS: You take unnecessary risks whenever you buy 'cheap' springs of uncertain quality; low initial outlay will never balance the ultimate harm they may do to your product, your prestige and your purse. When you specify "Springs by Salter" you're certain of getting top-flight quality — quality that cuts out risk and guarantees years of highly-efficient, dependable service. Only the best — of materials and workmanship — is good enough for SALTER.

INSIST ON QUALITY

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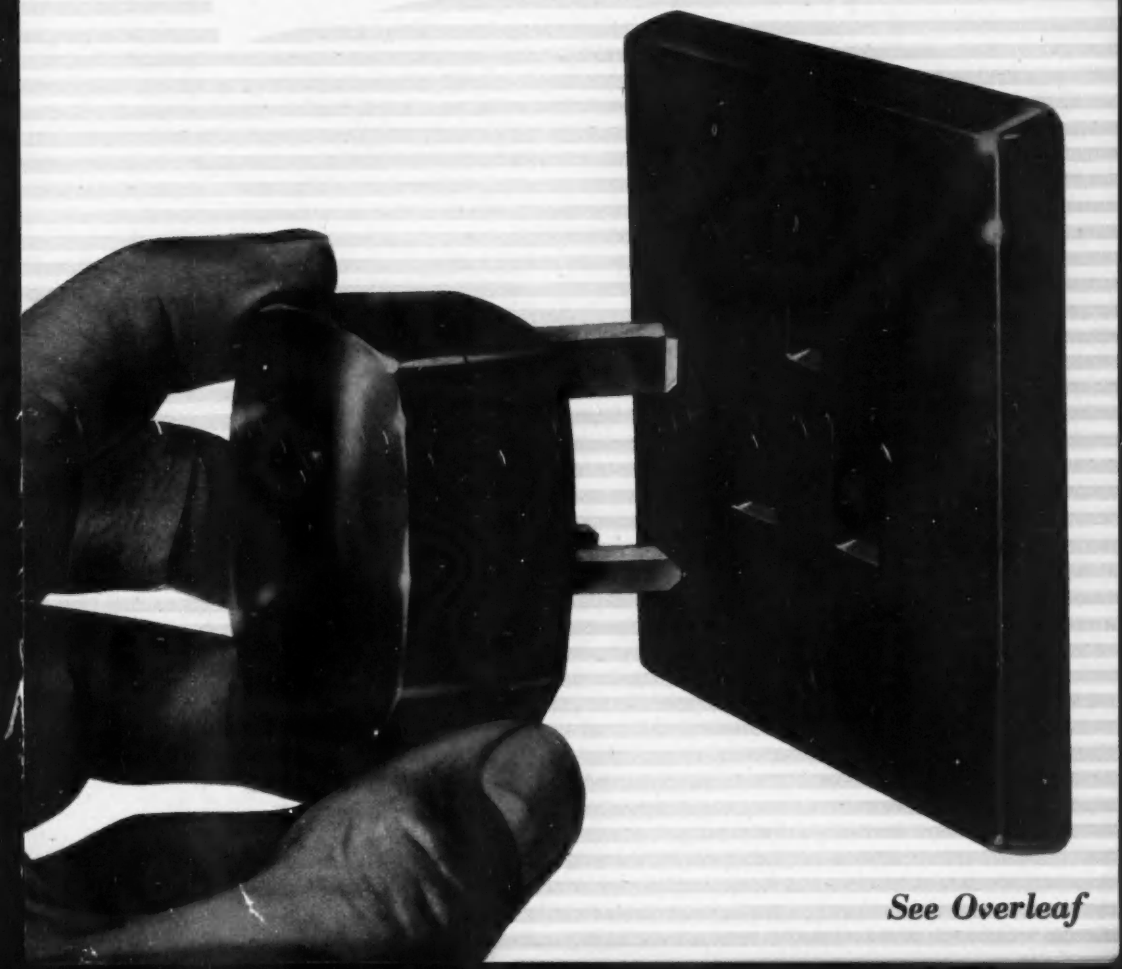
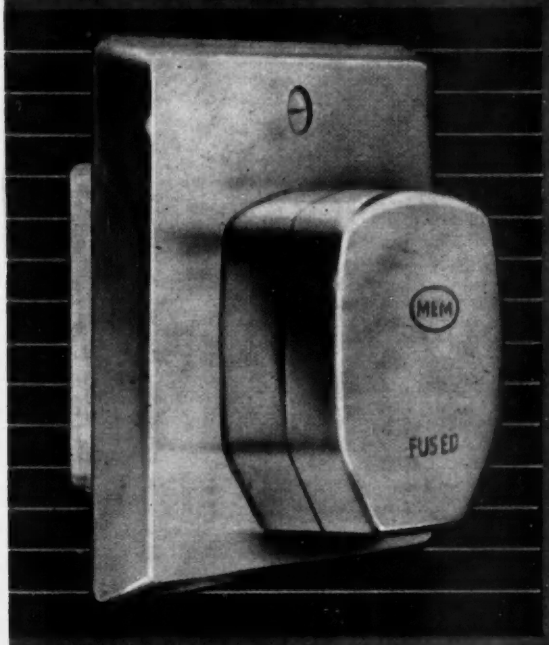
It's MEM now for Plugs and Sockets

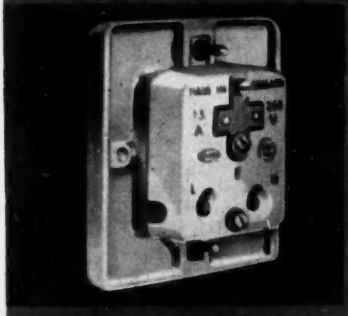


See Overleaf

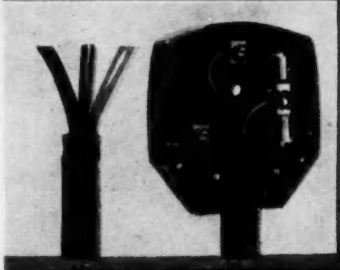
M E M *adds Plugs and Sockets to its range*

To BS.1363. In Brown and Ivory White.





MEM make all parts, including porcelains.



Here are M E M's versions of 13 amp. 3-pin fused plugs and shuttered socket outlets to comply with BS.1363. See how well M E M have tackled this new job of design and production. The new designs for domestic and similar purposes are suitable for ring main circuits, and include all these desirable features:

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* *Porcelain base of socket is definitely non-tracking.*
* *One piece plug pins and terminals are removable and all cable leads can be cut to same length, thus facilitating wiring.*
* *Plugs will accommodate BS.1362 cartridge fuse-links rated at 13, 7 or 3 amps. Spare provided for spare fuse in plug cover.*
* *Pressed steel boxes with knockouts are available to British Standard Specifications. Wood boxes also supplied.*

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M E M Switch, fuse and motor control gear, electric fires and localised lighting equipment

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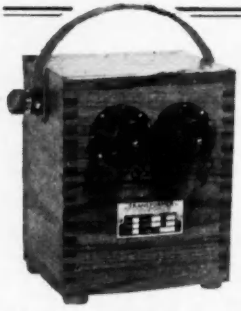

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WE MANUFACTURE A COMPLETE RANGE OF LOW VOLTAGE TRANSFORMERS SUITABLE FOR PORTABLE MACHINE TOOLS, HAND LAMPS, ETC.

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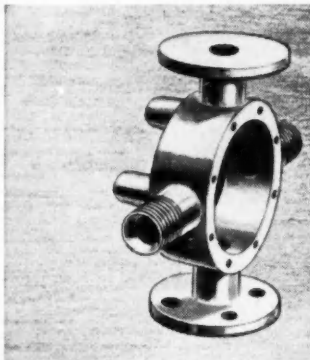

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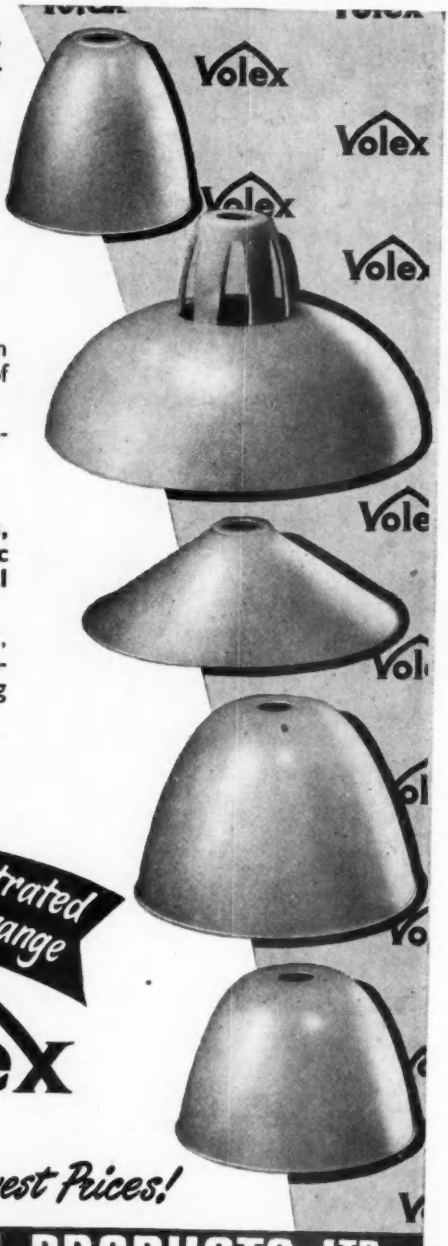

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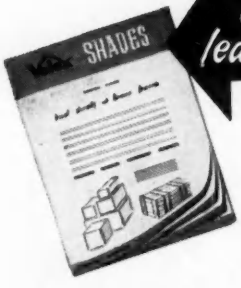

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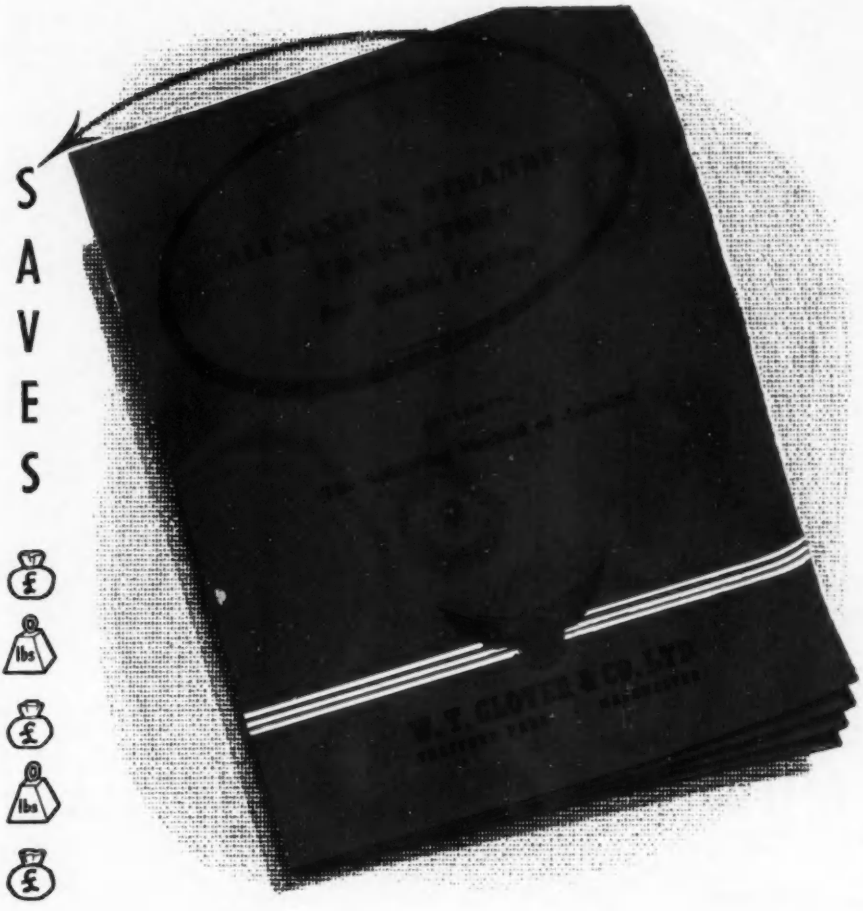

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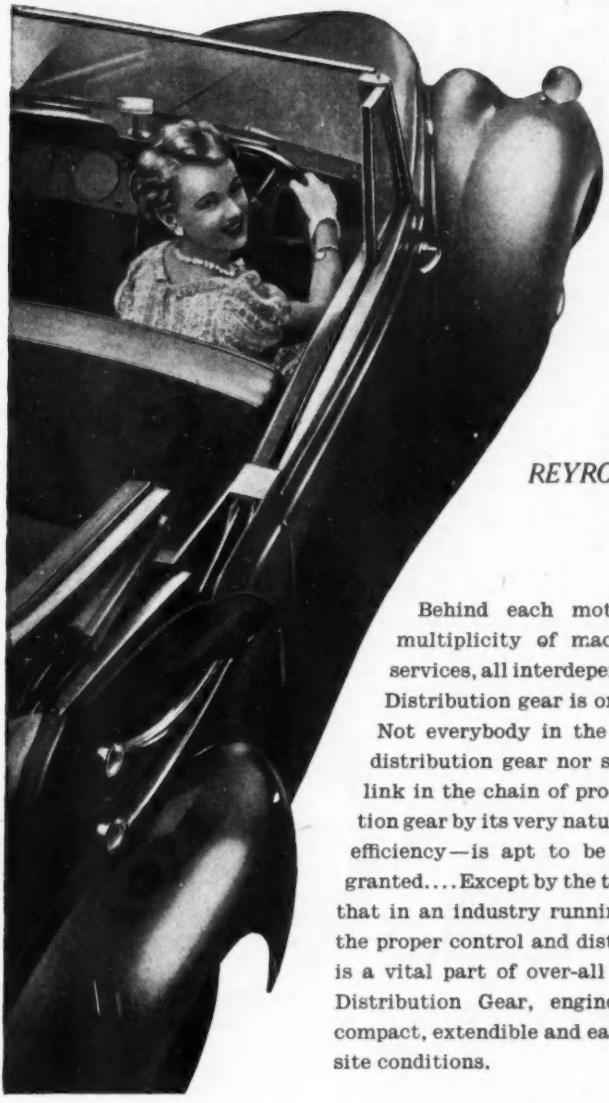

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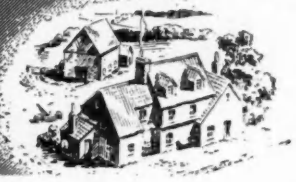

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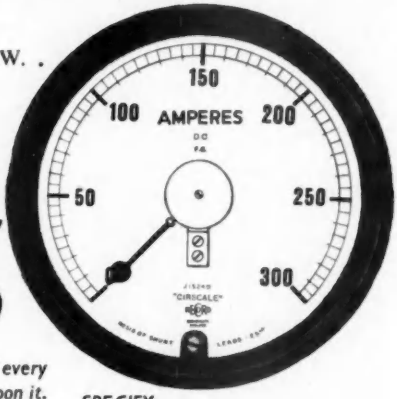

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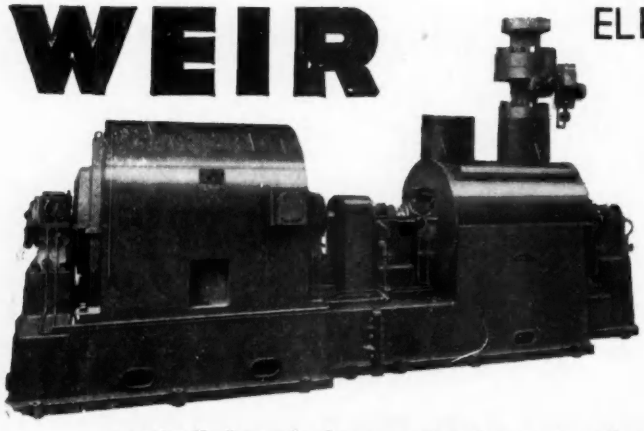

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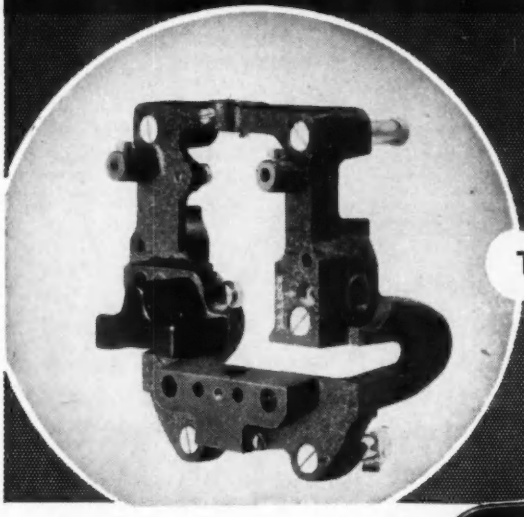

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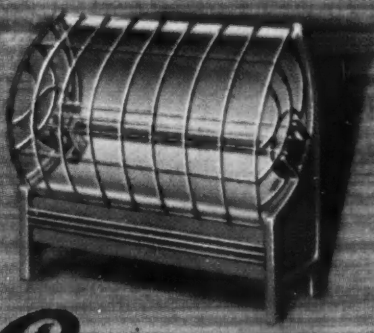

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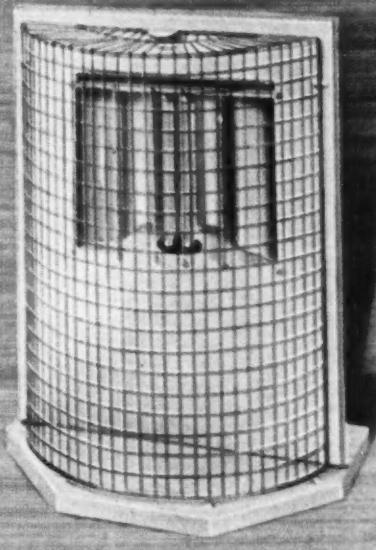

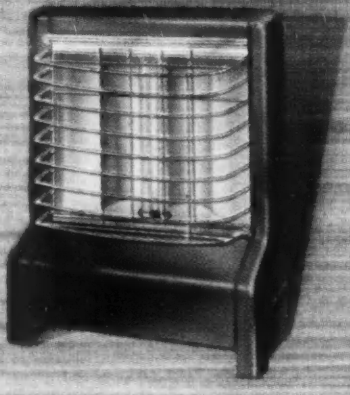

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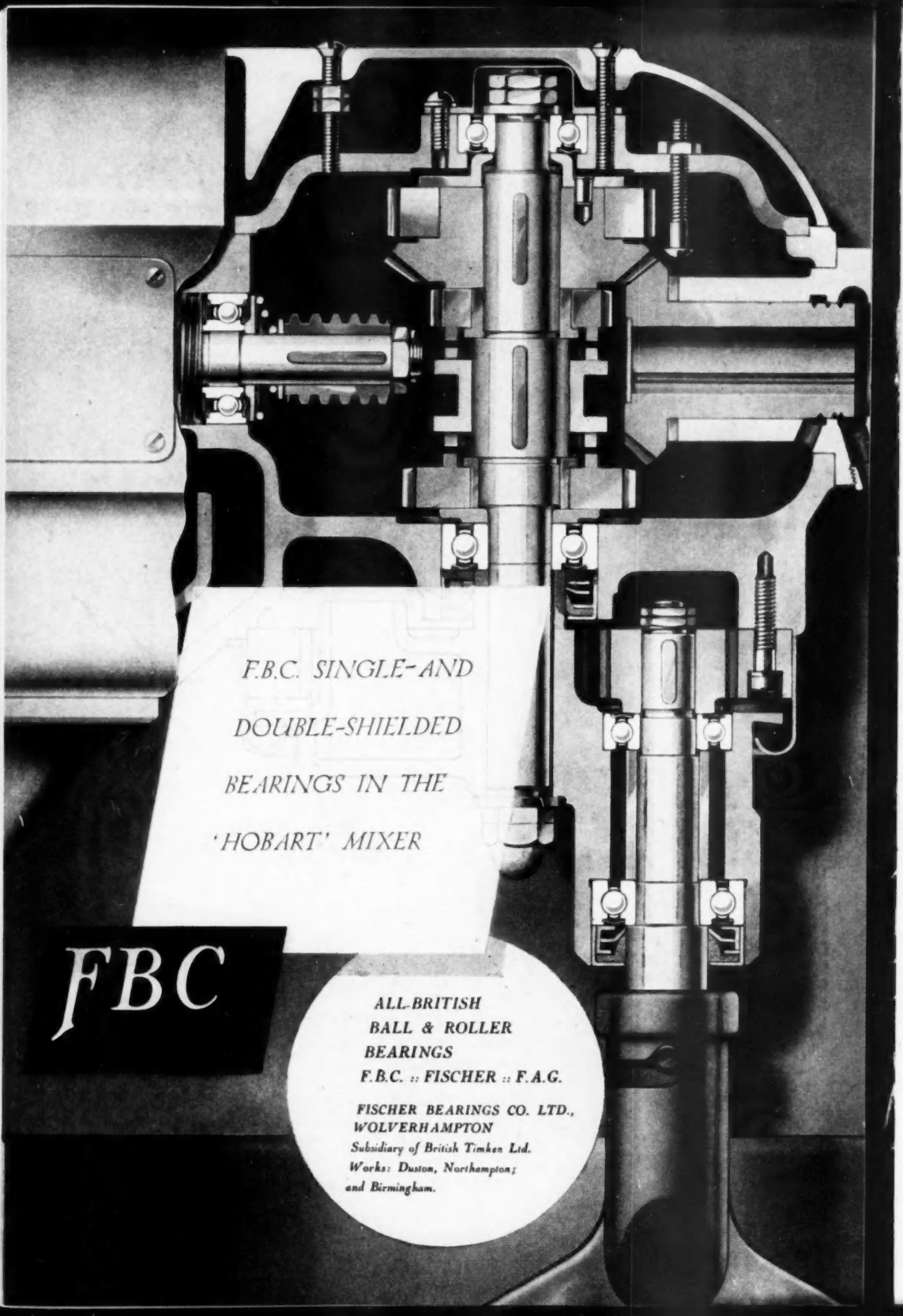
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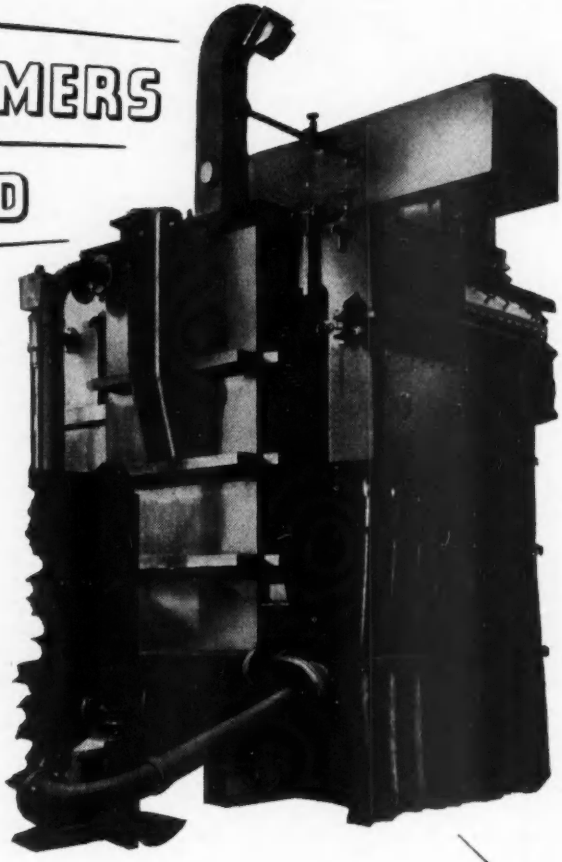

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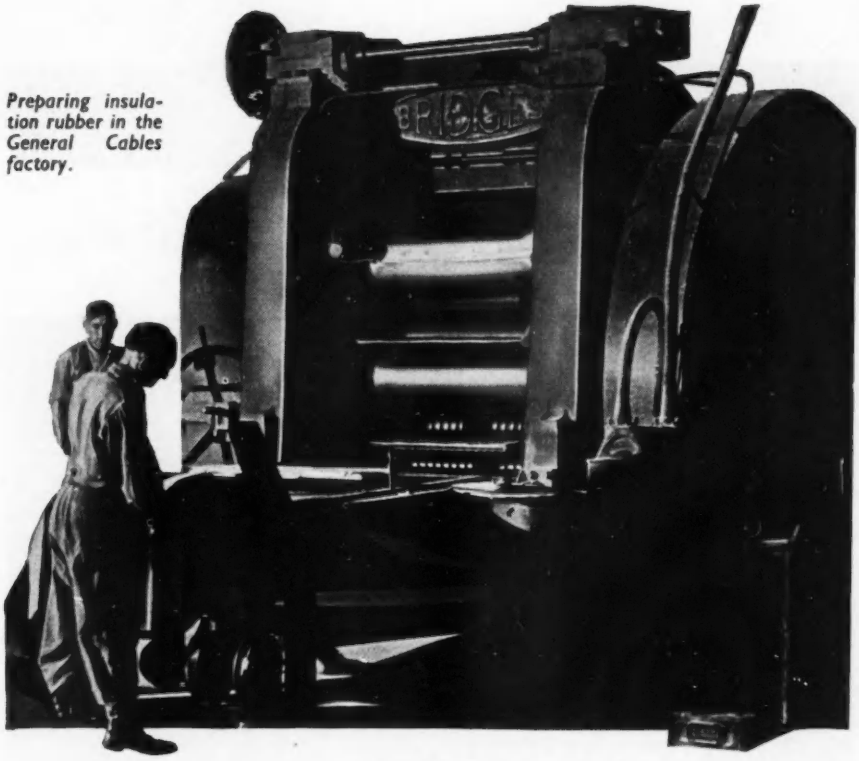

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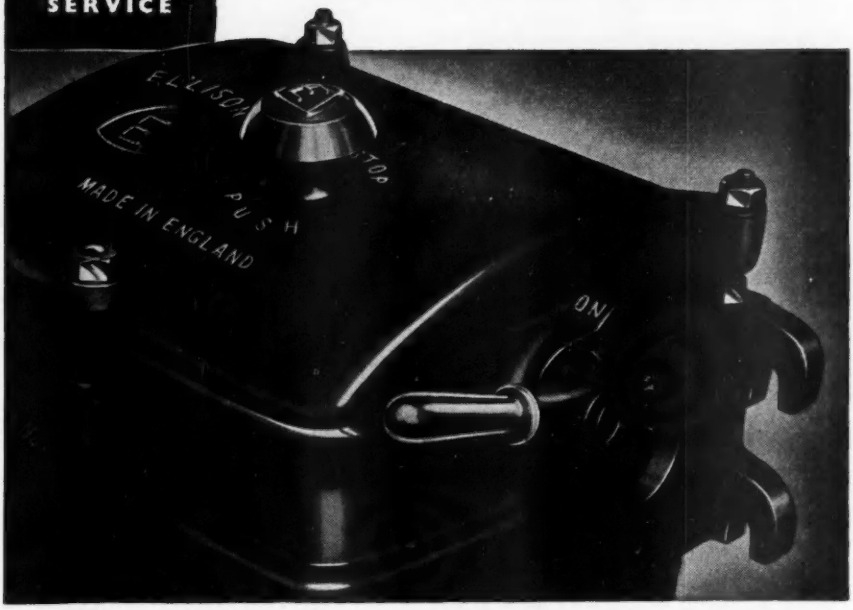

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Vol. 122 No. 3182 THURSDAY, 30 OCTOBER, 1952

PUBLISHED EVERY THURSDAY

SIXTY-SECOND YEAR OF PUBLICATION

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Editorial

MEN AND MACHINES

TO achieve a thermal efficiency of 29·5% with the comparatively low steam conditions of 600 lb/sq in. and 850° F, even using reheat, is truly a remarkable performance. Yet this figure was attained by Unit 5 at Dunston "B" station in its first year of operation. While this may be held by many as a complete vindication of the reheat cycle, Mr. Peattie, speaking in a recent discussion on the operation and design of Dunston "B" II, emphasised that the adoption of reheat was only a contributory factor in the attainment of this high performance. In his view, the reduction of "parasitic" losses was of great importance, and it was in this field that the major success had been attained. But there is, in addition, a further factor, not so amenable to cold analysis—the *esprit de corps* of the operating staff. From the beginning of the project, care was taken to train the operators as a team, to develop and maintain enthusiasm, and to provide them with data on the day-to-day working of the plant. The contribution that this technique can make in terms of thermal efficiency is not amenable to calculation, but its effect is undoubtedly reflected in the record performance of the unit.

ASH AND CLINKER

WITH the continuous downgrading of the quality of coal, the problem of ash and clinker becomes steadily more serious. And with the prospect of unit boilers powering sets of 100 MW and above, the boilermaker is confronted with increasing difficulty in maintaining availability. For this reason the conference on ash and clinker, recently held by the Institute of Fuel has served a most useful purpose in providing a comprehensive picture of the present knowledge on this most important subject. Although the physics and chemistry of boiler deposits are now well known, the avoidance of such deposits is still the subject of investigation, and if overall efficiency is to be improved by raising temperature and pressure, the problem will become more acute and difficult of solution. In fact, Dr. Crossley of the B.E.A. went so far as to put an upper limit of 1,050° F on superheat, maintaining that at temperatures above this, the oxidising action of the acid sulphates was a potential danger to superheater tubes. If this be so, future development, as in Dunston "B," will have to be on the lines of improving the cycle efficiency rather than by the use of higher temperatures and pressures. This may, in time, lead to a considerable divergence in design trends between this country with its inferior coal and the United States, where boiler firing problems are minimised due to low ash low sulphur fuel.

LIGHT VALUES

CODES of recommended illumination values for different industrial and domestic tasks are a tool with which the installation engineer is well familiar. As is well known, such codes are based on experimental results obtained in tests of the "efficiency" reached in performing standardised visual tasks. What is not so generally realised is, that these carefully conducted tests still leave an arbitrary choice to be made before the code is drawn up. The efficiency which the tests measure becomes nearly constant at high levels of illumination, and the rate of increase of efficiency as these levels are approached is relatively slow. Thus economic considerations make it necessary to choose some value of illumination which will give a high percentage of the possible peak performance standard, and in the British code, the selected ratio is 90%. On this point, Dr. Walsh, who has had so much to do with the development of illumi-

nation science in this country, had some thought-provoking comments to make in an address he delivered last week. The two determining factors, he suggested, are the cost of light and the cost of labour. For instance, in Great Britain, the cost of light is now only one-thirtieth of the equivalent charge before the first world war, in terms of real values; a ratio in strong contrast to that applying to labour. This change has affected the illumination levels now used, some five to ten times as intense as were recommended in 1914. We wonder what the level to be adopted today should be logically, now that the need for increased productivity and sustained quality are more urgent than ever.

STOCK IN HAND

IT is customary at the end of October to consider the coal stocks held by the supply industry, in order to estimate prospects for the coming winter. This year a satisfactory picture is presented, with six and a quarter million tons available, representing seven weeks' supply at the maximum probable rate of consumption, and so offering an ample buffer against interruptions of transport by inclement weather. A gain indeed from the position two years ago, when the level was so low as to give rise to some anxiety. Moreover, in addition to this immediate reserve of fuel, there is an extra strategic reserve in the greatly increased amount of "saleable" open-cast coal held at sites and on central stocking grounds. At 2·4 m tons, this far exceeds anything reached since the war years; indeed, 0·2 m tons was a representative level in recent years. Two main factors have made this change in station stocks possible with only a slight increase in coal production. End-of-winter stocks in May were some 1·36 m tons higher than a year before, and summer consumption less this year than last.

RURAL WORLD

EARLY this week a study group in Geneva commenced work on a three-week interchange of views on the problems and possibilities of rural electrification throughout the world. This project is the latest stage to be reached on the steadily developing Unesco plan to formulate the lessons learned in countries which are electrically more mature, for the benefit of those which are only now developing schemes to supply scattered rural populations. When we first drew attention to this plan in this column just a year ago, we were hopeful that this country would co-operate with Unesco for mutual benefit. It is particularly gratifying to note that Mr. Cameron Brown, who has been so closely identified with rural work here, has in fact been enlisted to act as a member of a four-man panel of experts who are making a comprehensive study of reports received on European experience, in which they will be helped, incidentally, by the more widely representative group already mentioned. Some time next year a consolidated report to governments should become available as a result of this work, and this is likely to play an important part in raising world standards of living. The relatively swift progress being made with this project is a striking testimonial to the now well established efficiency of the E.C.E. Committee on Electric Power, whose secretariat is carrying through all the arrangements.

INCREASED EFFICIENCY

SOLID-FUEL enthusiasts are soon likely to have some increased efficiencies to boast about. They are always willing to accentuate such reassuring statistics without the proper qualifications, and a change in fuel research station practice is likely to encourage them. For good scientific reasons, the station is departing from the former basis of evaluating open-fire performance by tests which allowed for the burning up and dying down of the fire, so important economically, even though this method gave satisfactory repeatable results. In future, only the characteristics while steadily burning for long periods will be measured. The result will be a higher efficiency figure for the same fire. With all the bases of calculation of efficiency of solid-fuel fires, no wonder the poor purchaser is bemused.

Meteor

Repair and Maintenance of SMALL ELECTRIC TOOLS

Testing and Repair of armatures is discussed in No. 4 of this series by KARL WILKINSON

IT is probably the armature that shows the greatest development in portable tools. The amount of power obtained from such a small part is surprising and greatly exceeds that of a comparable item made in the early days. Although the maintenance man will be seldom called upon to repair such a specialised piece of apparatus, nevertheless a short description will not be out of place.

Construction

The armature of most electric tools is of normal construction in the majority of cases except where the drive end, usually but not necessarily the end opposite to the commutator, is, for example, hollow to house a piece of mechanism. There is a tendency in modern tools to simplify the construction, and to make the shaft of adequate size for the speed and torque required, with as few lands and shoulders as possible. The stampings are pressed on to this shaft either up to a predetermined point or up to a shoulder. They are seldom bolted up as used to be the practice. They rarely become loose, but should they do so, the job is obviously beyond the resources of a maintenance man and the armature must be replaced. The commutator is also normal and is seldom of the moulded type except for certain makes and in particular in one model of small drill where a moulded radial commutator is used.

As these tools increase in size, and hence the power required, the armatures tend to become longer, which often facilitates their incorporation in the body of a tool. In a similar way unit stators and rotors are made long and of small diameter for building into machine tools. On the other hand certain vacuum cleaners and blowers are made with the bore enlarged and the stack of stampings very narrow. This also allows them to be built into a tool conveniently.

As these portable tools become larger so the slot design alters. Consider a small vacuum cleaner, paint sprayer or blower. Very few have less than 11 slots and with two bars per slot we have 22 commutator bars. This is probably the minimum to obtain good commutation. Larger sizes will have 13, 14, 16 or 18 slots with up to four circuits/slot, giving in the last case a total of 72 commutator bars. These commutator bars are necessarily very narrow and while they assist commutation they can give trouble to the repairer when undercutting, of which more later.

When the armature has been removed from the machine the ball races should be drawn and the whole wiped clean. If it is very oily or greasy it can be lightly washed with petrol or other solvent such as carbon tetrachloride or trichlorethelyne, or even paraffin, and blown dry with an air line. Do not immerse in the solvent and be careful of high pressure air when cleaning a small armature wound with fine wire as it is possible to blow the fine leads adrift. Armatures full of dust only, do not require any solvent.

Testing

The armature is then tested for insulation to earth, the voltage used depending on the working voltage of the machine. It is rather difficult to say what is a safe minimum reading but for a 230 V machine anything below one megohm, using a 500 V megohm meter, should be condemned. It should always be remembered that portable tools are so often used in appalling conditions that every endeavour should be made to keep the insulation to earth as high as possible, whether or not any additional protective devices are used. Indeed it is the writer's opinion that no portable tool should operate on a voltage exceeding 50 to earth. Very few people realise that on many electric tools the slot insulation may only be 0·007 in. of presspahn or leatheroid and the field coil assembly frequently insulated with one layer of cotton tape, half lapped and varnished maybe, yet pressing hard against the field stampings.

It is as well to remember that a reading, made with a megohm meter that tends to rise slightly after a few turns of the handle is a good sign but a reading that gradually drops in value is bad and often indicates potential failure of the insulation.

Two common points of low insulation are the ends of the slot linings and the end, i.e., the cone, of the commutator. Little can be done to the slot insulation apart from very gentle cleaning at the ends with an old tooth brush or a pointed wood probe to remove any gross accumulation of dirt but the commutator end can be lightly scratchbrushed and so improve the insulation enormously. Apropos this last point many small d.c. motors, especially those operating in a damp or steamy atmosphere are very prone to tracking over the ends of the commutators. After cleaning, the commutator end can, if desired, be treated with a finishing varnish to protect it.

A flash test, of 1,000 or 1,500 V is not always desirable on an old winding as it may permanently damage the insulation of the armature which may be perfectly satisfactory when operating on its normal voltage.

Volt Drop Test

As this test is well known there is no need to describe it in detail. A variable reading will often be found on a perfectly sound armature if the armature is "hand wound" as the coils will vary in size as they are placed on the armature. We must point out here that the phrase "hand wound" is used in contradistinction to a former wound armature where all the coils are of the same size. In the "hand wound" armature each coil is placed on the armature and overlies the preceding one, the last coil being fully visible. In spite of the fact that we call them "hand wound" they are usually wound by machine, following the hand technique. There is a lack of terms to describe various winds and this at times, apart from making explanations difficult, may actually be misleading as the phrase "progressive wind" is sometimes used to express the wind just mentioned and yet the "progressive" does not refer to the connection to the commutator, but to the method used in placing the coils on the armature. An armature wound with former coils will give almost identical readings on a bar to bar test.

While the bulk of these armatures are lap wound, the repairer, when volt dropping, should always be on the watch for the exceptional job such as a wave wind with an extra bar and jumper to complete the wave circuit or, alternately, an ordinary lap wind using an incorrect commutator with an extra bar shorted to it's neighbour. In these days of shortages a winder may have been compelled to use the nearest available commutator with too many bars. The difference of one in say a total of 48 would be immaterial as long as the connections were correct.

In spite of careful volt dropping there is always one fault that may escape location. That is the flying short. When, or if, such a trouble is suspected the machine must be assembled and given a run. If the speed, and note, of an armature suddenly drops after a while it is often a sure indication of a flying short, and yet the armature may have been perfectly sound on the volt drop test. Some of these flying shorts only develop when the motor is quite warm, consequently the running test must be long enough to raise the temperature of the machine.

If a growler is used for the preliminary test a growl or series of growls certainly indicates trouble but the fault may not necessarily be in the winding itself. The commutator should be inspected—a loose brush box can quite easily cause a burr on the bars and so give a short. Similarly a brush worn down to its spring will lead to the same trouble and a very dirty commutator with conducting material in the undercut slots between the bars will again give shorts and hence growls. Finally we can have one make of tool with a type of shaded pole on either side of the armature. This consists of two closed circuits of wire or strip encircling a slot pitch, one on each side of the armature. These will also cause growls, but as the "shaded poles" are visible the growl will not be confused with a fault due to a shorted winding.

Certain larger continental portable tools such as compressors, do not have a series motor and use instead one of the many varieties of repulsion or repulsion induction motors. This latter must not be confused with the repulsion start induction run motor. The repulsion induction motor has, buried beneath the armature windings, a small squirrel cage winding of copper strip with the ends knocked over and soldered to form an end ring. This hidden winding will give a slight growl in every slot while the volt drop test will, of course, be constant even for a sound armature.

Still larger machines are frequently fitted with a compensated repulsion motor which can also be found in many varieties. The brushes vary from four to seven, usually four, of which two are shorted together while the other pair is in series with an auxiliary winding

superimposed on the main stator winding and displaced 90 electrical degrees. The compensating winding may also be in series with a choke built in the foot of the motor stator and invisable until the machine is dismantled.

These last examples have been cited to impress on the repairer the need for observation. He must not assume that every machine is similar and he must always expect the unexpected.

Commutator Machining

Commutator machining should present no difficulties to the experienced man, but be careful that the commutator is concentric with the journals, otherwise brush bounce, excessive wear and bad commutation will occur. The centres in the shaft ends are often found untrue, usually after a battle in withdrawing a tight race or pinion. As one of the centres will be required in order to turn the commutator it will have to be trued if necessary using a steady in the lathe. Apart from bad centres, many machines have centreless shafts. These of course, can be steadied and drilled with a Slocombe drill but not, as sometimes happens, when the shaft is hardened. This will mean turning the commutator between chuck and steady or, if a run of similar armatures is undertaken, making up a jig in the form of a muff with a centre to slip over the end of the shaft.

Always avoid cutting back the risers too much as after repeated machining these risers may become so thin and weak that bad contact may occur where the leads are soldered in, especially as is sometimes the case, where the solder does not completely fill the riser slot.

Undercutting

This question has been discussed before in these pages. As we are confining our remarks to portable electric tools the matter is greatly simplified and merely consists in following the procedure adopted by the makers, assuming that the machine has been opened for the first time. If the repairer is following the work of other people, complications may ensue. In brief most portable tools are undercut; if in doubt, undercut; a deep cut is far better than a mere scratch.

The 48 bar commutators are extremely difficult to undercut by hand and a machine is desirable. The commutator should be well polished after cutting, and blown clean.

Finally, loose binding on the winding behind the commutator risers must be replaced as the high speed may throw and break the fine leads connected to the bars. The new binding should be covered with a finishing varnish. Similarly, loose wedges in the armature slots require attention, although a fault of this nature is rather rare.

Cooling fans, usually on the drive end of the armature, often come loose and can, if ignored, easily damage the windings. Repairing is not always simple where the shaft is hardened as this precludes knurling. The fan can, of course, be repressed on the shaft with a liner of shim stock, assuming the slack to be very little, but there is always the danger of the shim piercing the winding when the fan is very close. If necessary the fan can be bushed in the usual way.

Cooling fans on the armature are often found with one or two blades broken off. While this may not seriously affect the ventilating, it will certainly alter the dynamic balance of the rotating part. If only one out of many blades is missing, another one diametrically opposite can be removed to restore the balance. This is obviously a repair of limited application and the fan should always be replaced if one is available.

Mechanical Balance

It is seldom necessary for the repairer to rectify an out of balance armature. Most of the better quality tools have the rotating parts dynamically balanced during manufacture and this method cannot be followed by a maintenance man as special equipment is required. He can, however, rectify static out of balance which may or may not reduce vibration. This operation only requires two narrow steel strips with flat polished edges. These are set up dead level and the armature laid upon them. If correctly balanced it will rest in any position. Conversely, if out of balance, it will come to rest with the light side uppermost. Weight, in the form of lead or brass strips, is inserted in the slots on the light side and adjusted until the armature will rest in any position. Care must be taken in inserting these metal strips to avoid damaging the conductors in the slots. If it is impossible to enter them under the slot-lips they can be caulked in the slot mouth. Weight should not be added to the periphery of the cooling fan, unless unavoidable, as this will sometimes increase the dynamic out of balance while rectifying the static balance. Each end of the shaft, where it rests on the balancing rails, must be of the same diameter or the test will be faulty. This may necessitate turning up sleeves to bush a shaft end up to match its fellow.

Other Repairs

Unless the repairer is also an armature winder little can be done to a faulty winding. Occasionally an armature is received with the solder slung from the risers, leaving the conductors more or less loose in the slots. (This is nearly always a sign of severe overload if everything else is in good condition.) Such a fault would appear to be a simple resoldering operation. Actually it is not so, as the conductors are probably corroded or even burnt where they lie in the slots and a non-corrosive flux will not be sharp enough to resolder the wires satisfactorily. Therefore, what may appear to be a sound job may in reality be merely a blob of solder on the top of the risers with the conductor held mechanically, in position. This will give a high resistance joint and will again lead to failure after running for some time. It is hardly necessary to say that a corrosive flux must on no account be used. Moreover, such a condition, causing the solder to melt, will so often damage the winding to some extent and as a result the repair may after all be a waste of time.

Broken Armature Wires

Certain types of armatures are rather prone to develop breaks in the wires leading from the winding down to the commutator. The break usually occurs immediately behind the riser and, as they are normally covered with a binding, the damage is not immediately apparent. The micas between two bars concerned with the open circuit will exhibit bad burning and thereby indicate the trouble. Such breaks usually occur in conductors finer than 0·0076 in. and can be due to a number of causes such as : incorrect varnishing, binding too loose or too tight, wire damaged in stripping or in winding, loose commutator, loose core, old age and to a periodic vibration that in some cases is said to be related to the teeth of the gear train. These broken leads can, of course, be repaired but if more than one or two are concerned it is wise to rewind or replace the armature.

Other Armature Repairs

Apart from worn shafts, dealt with in a previous section, an armature may have on rare occasions a bent shaft due to some violent cause, since no ordinary usage would result in such a fault.

These bent shafts can, to a certain extent, be straightened but it is rather a tricky business. Very small shafts—say below $\frac{1}{4}$ in. can be set while still in the lathe by chucking one end and springing it true by hand. Anything over this size cannot, naturally, subject the lathe to such brutal treatment and a press is required. Broken shafts, that are broken outside the stampings, are seldom possible to repair satisfactorily in small portable tools, although it is a straightforward job in larger tools. Naturally the position of the break will determine the feasibility of an economic repair. For example, a break close to the windings or adjacent to an integral pinion will hardly be worth attempting under normal conditions, whereas a break, or alternately, damage to the shaft on the commutator end is another matter. Here we have a much simpler proposition as this end of the shaft is seldom complicated by the presence of pinions and can be readily spigotted or sleeved. Damaged key ways can be recut at 90° or, if desired, built up by welding and re-machined in their original position. Similarly damaged threads, retaining ball races, or fans, can either be run over with a die, built up and recut or reduced in diameter and rethreaded.

One of the difficulties in repairing the commutator end of a shaft is to find space for the lathe steady, especially when dealing with worn shafts that only project perhaps $\frac{3}{4}$ in. beyond the commutator boss, i.e. just sufficient to carry a ball race. If the commutator is in good condition its surface can be used for the steady; if, however, it is undercut or ridged it can still be used but will want a sleeve lightly pressed on it before the steady is set up. If the repairer has a chuck large enough the small armature can be held on the stampings, also covered with a piece of shim stock if the number of slots is not suitable for the three jaws to hold.

Many armature shafts are centreless and that means a steady in order to machine the commutator. If runs of similar jobs are undertaken it is worth while to make up a steel muff with a centre in the end to slip over the end of the shaft. Other armatures, mainly from cheap machines, have male centres which merely require a female back centre.

Should an armature have the stampings damaged as a result of the failure of a bearing, so allowing them to rub on the field assembly, the trouble may vary from a mere polishing of the stampings, to violent distortion and the slot teeth may be bent over the winding space. This latter fault so often means damage to the windings, but if the winding is still sound the teeth can be straightened by drifting them with a punch and lightly machining all over with a very sharp tool to restore concentricity.

An armature badly burnished on the stamp-

ings can run hot because of the increase in eddy currents. Light machining will also help to cure this trouble.

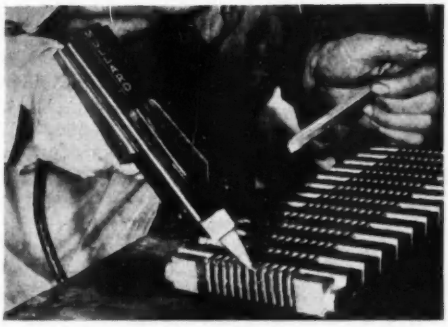
Revarnishing the armature windings is seldom necessary or desirable. So many repairers are fond of applying a coat of finishing varnish because it makes the completed job look smart. Unless varnish is required for a specific purpose, such as holding loose wires or insulation, and unless it is correctly baked it is of little use and may even be detrimental. These remarks do not apply to the coat of finishing varnish applied to a new string binding where a covering is necessary.

FOUNDRIES USE ULTRASONICS

IT is generally acknowledged that the increasing popularity of ultrasonics applied to the tinning of aluminium and light alloys is due in some measure to its efficiency and comparative simplicity. A recent example of its usefulness in foundry work for treating surface flaws in light alloy castings indicates the widening field of application that ultrasonic soldering equipment now enjoys.

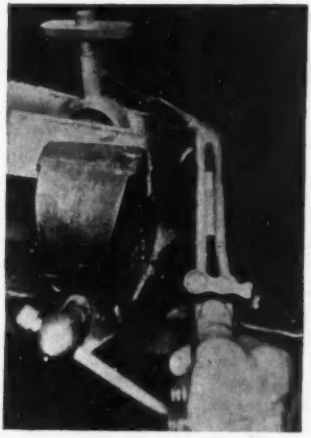
Repairing Surface Flaws

A frequent method used to make good the casting imperfections due to blow holes and embedded dross has been filling the cavity with either metallised glue or molten aluminium. Although this is usually satisfactory, there have been occasions when a poor finish has resulted. Ultrasonic soldering equipment designed by MULLARD ELECTRONIC PRODUCTS, LTD., has been used successfully in making good these surface imperfections and yet providing a good finish. No radical departure from conventional practice is involved in using this equipment except that the bit used to tin the metal surface is vibrating at ultrasonic frequencies. The surrounding metal of the imperfection being treated is raised to the temperature of molten solder and using a tapered bit the inside surface of the cavity is tinned. Solder is then run in to fill the hole, subsequent machining leaving an almost perfect finish.



Ultrasonic soldering equipment being used to rectify surface running faults

A further use for this equipment in foundry work is found in modifying patterns made from aluminium. This metal has taken preference over wood in certain cases, due to its relatively high strength. During casting, however, it is sometimes found necessary to make small additions to the pattern, a process, which can, in certain cases, prove somewhat difficult. By tinning the surface of the metal where the modification is being made other parts can be added with comparative ease.



Completing the addition of an extra part to an aluminium pattern

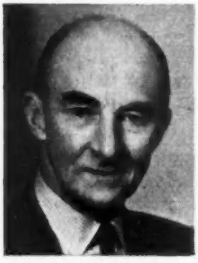
Soldering equipment used in this work consists of conventional type low voltage irons, the heating element being supplied from a transformer. The bit is connected to a magnetostriction transducer which converts electric energy at ultrasonic frequencies into movement at the same speed. This movement thus applied to the bit is quite small, amounting to a few thousandths of an inch. Although the mechanism by which ultrasonics effect the tinning of aluminium is not fully understood, it is generally believed to be due to cavitation in the solder, destroying the oxide film which builds up on the heated metal surface.

EQUIPMENT FOR SUPPLY

Mr. C. M. Cock reviews the position today

AN overall review of the equipment of the supply industry was given by Mr. C. M. COCK, M.I.E.E., in his chairman's address delivered to the I.E.E. Supply Section yesterday. His theme was "the tools for the job" which the supply industry in this country had to carry out. Inevitably, such a review covered briefly many more subjects than it is possible to mention in a short report, and so only his more outstanding points can be noted.

On the size of generating sets he noted that for the next step in size in this country, 150-180 MW, a three-flow exhaust will be necessary to limit the leaving loss to a reasonable value. For water-turbines, transport and handling facilities often provide a limit, but using Pelton wheel designs with several jets per wheel, outputs as high as 160,000 h.p. were possible. With medium head Francis turbines, a type which produces most of the world's electricity derived from water-power, sets up to 150,000 h.p. are normal.



Mr. C. M. Cock

In turbo-alternator development, a notable move has been the departure from generating direct at 33 kV, now that the output is usually fed into large interconnected transmission networks. Hydrogen cooling has been an important factor in increasing the loading of machines, while another important development is the use of hollow conductors in both stator and rotor through which hydrogen is forced at high velocity.

Transmission

Switchgear ratings have increased markedly in recent years, to keep pace with system interconnection. At low-voltages, air-break c-bs. widely used for power station auxiliaries, have given good performance, and it is worthy of note that they are used for voltages up to 15 kV in the United States.

Transformers are largely limited in size by transport restrictions, though 180 MVA units may have to be installed in future h.v. substations. Silicon steel having a loss value of 0·45 watt/lb is used, but the more general availability of cold-rolled silicon steel, as used in the United States, offers possible further scope for improvement in efficiencies and reduction in weight, etc. It is anticipated that cold-rolled steel will be produced in Great Britain in the near future.

In connection with o.h. lines, one of the most interesting structural features is the extent to which various countries are revising their regulations and technique governing design. New British regulations have been drafted and are likely to be introduced soon.

The Future

Turning to the future, Mr. Cock reviewed the developments that are being discussed, such as d.c. transmission and wind and nuclear power. His conclusion was that much has been done energetically and progressively in meeting the rising costs of labour, materials and fuel, and economic difficulties. One example of the success achieved was the contrast between the sharp increase in costs of fuel, wages and equipment over the last twenty years compared with the decrease in the overall cost of electrical energy.

Evaluating the prospects of d.c. transmission, he noted that it offers better utilisation of materials than is possible with a high voltage a.c. Though there is no d.c. equivalent to the transformer, and no normal means of switching d.c. of large power at high voltage, the rectifiers and inverters are almost perfect switches through the operation of their control grids. Moreover, they can provide a degree of voltage regulation and load control which would be difficult to obtain on an a.c. system. The two transmission systems are essentially complementary, and the choice between them will be decided entirely by the relative technical and economic merits of each individual installation. Although d.c. lines and cables cost considerably less than those for a.c. transmission, the terminal equipment costs more.

Although this progress may be satisfactory to contemplate, the job is not completed. Invention, the development of new ideas and research continue actively to provide even greater economies in the use of fuel and other resources, and greater amenity and convenience in the service of man.

DUNSTON "B" II

Operating Experience and Design of this Medium Pressure Reheat Station Described at I.E.E.—I.Mech.E. Joint Meeting

AN interesting and enlightening paper was presented last Friday by Messrs. A. Howell and J. B. Jackson to a joint meeting of the Institutions of Mechanical and Electrical Engineers. Dealing with the practical experience in operating the two sets (Nos. 5 and 6) at Dunston "B" power station, the paper contained a wealth of interesting data, as well as giving a comprehensive description of the design details of these two new machines.

The authors began by giving a comparison between the previous type of machine and the new sets. When Dunston "B" was originally planned it was laid out for six 50 MW units, of which four had been installed in 1939. These sets all ran at 1,500 r.p.m. with a boiler pressure of 600 lb/sq in. at 800° F, with reheat to 800° F at pressures ranging between 115 lb/sq in. and 151 lb/sq in., depending on whether they were running at maximum economic rating (m.e.r.) or maximum continuous rating (m.c.r.).

When, however, in 1945 it was decided to proceed with the installation of the final two units, certain modifications were introduced which had been made possible by technical developments in the intervening years, or which seemed desirable due to accumulated operating experience. The most important of these was the adoption of the unit system, whereby one turbine was to be associated with one boiler. Although this would normally have left a free hand in the selection of the steam cycle, a combination of local circumstances made it advantageous to retain the existing steam pressure in the station, but the temperatures both of main and reheat steam were raised by 50° to 850° F.

Machine Design

The two new machines were three-cylinder double-exhaust sets running at 3,000 r.p.m., a contrast to the older units which were two-cylinder single-exhaust types running at 1,500 r.p.m. This change made possible a slight saving in overall length. No overload by-pass was provided on the h.p. cylinder of the new sets thus simplifying the design and making the m.e.r. and m.c.r. identical at 50 MW.

It was also decided to drive the main oil pumps for each of the new sets from a separate a.c. motor. This allowed the governor gear for both h.p. and l.p. reheat steam to be driven from each end of the cross shaft at the turbine steam end. Oil supplies were ensured by the provision of steam driven pumps which would automatically come into action in the event of failure of electricity supply to the motors, or if the bearing pressure fell to a low value. Protection was also provided against overspeeding of the machine in the event of a trip out by providing a relief valve on the pipe to the reheater inlet, emergency over-speed trips and a vacuum breaking valve.

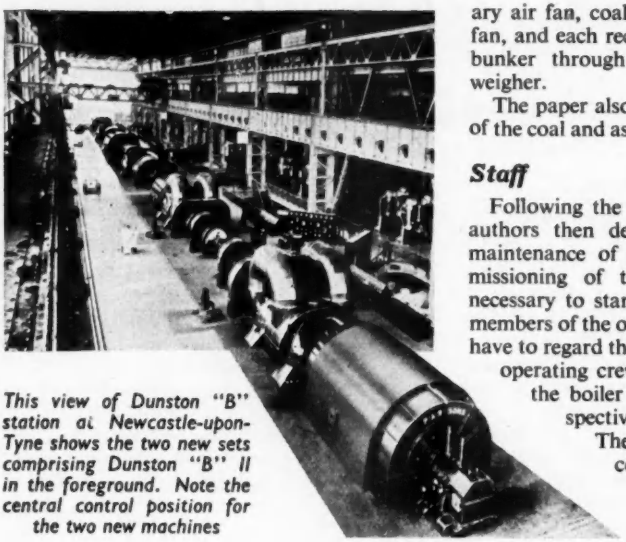
Feed System

The feed system included two extraction pumps, each of 100% capacity, for each machine and the condensate could be measured either by the station's weigh tanks or by precision venturi meters. To reduce aeration in the elevated hot wells they were maintained at 195° F by steam heated coils which were provided with bled steam from the l.p. abstraction point, or by electrical "topping" heat when the machines were running on light load.

Two motor-driven feed pumps were provided for each boiler, each of sufficient capacity for full load, thus giving a 100% standby service. All four were connected to a common discharge header with a single steam driven pump in the centre, so that by operation of sectioning valves in the suction and delivery headers the steam driven pump could be made available to provide feed water for either unit.

Alternators and Exciters

To permit the use of more standard equipment, the voltage of generation in the new machines had been reduced from 13·5 kV to 11 kV. Special care was taken in designing the rotors to minimise copper distortion, and a larger copper section than usual has been used. This in turn led to a high excitation current (about 630 amp at normal load), and in view of the difficulty that had been experienced with direct-coupled, high-speed exciters, handling even lower currents, it was decided to use a



This view of Dunston "B" station at Newcastle-upon-Tyne shows the two new sets comprising Dunston "B" II in the foreground. Note the central control position for the two new machines

motor-driven exciter at a speed of 1,000 r.p.m.

The same motor was also used to drive the single alternator ventilating fan, an arrangement which helped maintain exciter speed under low voltage conditions due to the flywheel effect of the fan.

Boilers

Each boiler had an output of 410 klb/hr at 625 lb/sq in. and 865° F reheating 365 klb/hr at 147 lb/sq in. from about 563° F to 865° F. The equivalent evaporation rate on a heat output basis was 460 klb/hr. This represented a margin equivalent to 8% of the main steam quantity.

The boilers, of the high-head type, were supported independently of the steelwork of the building. Front and rear walls were of the standard Bailey-type with cast-iron blocks, while the side walls were of bare tangent tubes. Sixteen double-ported Calumet burners fired horizontally through the front furnace walls in two rows, while eight retractable oil-burners were provided for lighting up. These used pressure atomisation and were automatically spark-ignited on reaching their working position.

The two forced-draught and two induced-draught fans had inlet vane control, regulated in the former case by manual control from the instrument panel and in the latter by the automatic furnace-pressure control.

Each boiler had four constant-speed ball and ring pulverisers, together with associated primary air fan, coal feeder, classifier and seal-air fan, and each received coal from the overhead bunker through a separate automatic coal weigher.

The paper also contained a brief description of the coal and ash handling arrangements.

Staff

Following the description of the plant, the authors then dealt with the operation and maintenance of the station. With the commissioning of the new section, it became necessary to start a new tradition among the members of the operating staff, who would now have to regard themselves as members of a unit operating crew rather than as the staffs of the boiler house and turbine house respectively.

The two generating units, each consisting of one boiler and one turbo-alternator, complete with all auxiliaries were named "Unit 5" and "Unit 6" and the pair of units, with their installed capacity of 100 MW, was operated as a separate generating plant, known within the Authority's organisation as Dunston "B" II. The total staff employed on one shift consisted of ten men: one assistant shift charge engineer, one leading stoker, one stoker, one auxiliary plant attendant (boiler house), one auxiliary plant attendant (pulverisers), one fitter-driver, one auxiliary plant attendant (turbine house), one oiler and greaser, and two ash removers.

The leading stoker was in charge of the controls for the two boilers which were hydraulically operated from one large central desk-type board. Steam controls and gauge boards of the two turbines were also placed adjacent to each other and were under the care of the fitter-driver. These two men came directly under an assistant shift charge engineer responsible for the operation of the two units.

The members of the operating staff were selected during the later stages of the constructional work so that they could obtain beforehand as much information as possible about the plant which was to come under their charge. A book containing provisional operating instructions, diagrams and drawings was prepared and given to each operator. This volume also contained information on the operation of unit plants elsewhere and was designed to arouse interest and enthusiasm.

The paper then gave details of the eventual starting up and shutting down procedure which was evolved. Full load on the unit from

cold was reached eight hours after the first burner was lighted. The rate of loading was largely governed by the rise in temperature of the steam at the inlet to the l.p. cylinder which was normally restricted to 160° F per hour.

Operating Experience

Modifications—which had been anticipated in the design—had to be carried out to the gas by-pass controlling the superheater temperature to bring this temperature down, and a certain amount of slagging trouble occurred which has however been largely cured by providing excess air. Trouble was also experienced with hand hole joints on the topping economiser joints and bolted h.p. pipework joints particularly on the reheat piping.

Turbine troubles involved a blade shrouding failure on Unit 5, wear on the labyrinth glands in the same unit and trouble with the thrust bearings.

Test Figures

Comprehensive testing had been carried out on both units, and details of results were given in the paper. During 1951, Unit 5 sent out 305·714 million units at a thermal efficiency of 29·3%, and Unit 6 sent out 333·191 million units at 29·5%. These high figures were most carefully checked and were found under the most searching analysis to be correct.

DISCUSSION

Opening the discussion MR. J. D. PEATTIE (B.E.A.) pointed out that there were two ways of improving the thermal efficiency. One was to increase the pressure and temperature of the steam to increase the overall cycle efficiency, the other was to cut down what were known as the parasitic losses. A major part of the author's accomplishment had been in this loss reduction.

The size of set was commented on by MR. I. V. ROBINSON (B.E.A.M.A.). For a 60 MW non-reheat set, steam conditions of 900 lb/sq in., 900° F had been standardised. It was generally believed that 50 MW was on the small side for reheating. At the I.E.C., the B.E.A. had begun by advocating that reheat should not be applied to anything less than 120 MW. Belgium and Holland had held out for 60 and 80 MW, while France thought that 125 MW was more suitable. A final compromise had specified 100 MW as the minimum size in Great Britain with steam conditions of 1,000-1,500 lb/sq in. at 1,000° F.

He thought that the availability of 73 and 80% obtained with the unit boilers was good considering they were new types, and he believed these figures would be bettered in the future.

MR. A. S. DODDS (John Thompson Watertube Boilers) emphasised the wise policy of adopting a moderate furnace rating. He was interested to notice that superheat and reheat control was entirely in the hands of the operating staff, and that this control was all on the gas side, no attemperators being used.

MR. W. N. C. CLINCH (B.E.A.) wondered why the removal of the oil pump from the steam end was thought to reduce fire risk; queried the use of an atmospheric exhaust valve instead of a diaphragm; was glad to see that de-superheating was not employed and suggested that running up and temperature control was better done by steam dumping to keep the superheater cool.

The importance of minor economies was mentioned by MR. W. F. C. SCHAAP (B. and W.), who also emphasised the importance of notifying the boilermaker of the type of coal to be used.

MR. E. L. E. WHEATCROFT (Merz and McLellan) maintained that the reheat cycle was now justified. He doubted the soundness of the unit system on a long-term basis. As far as Dunston "B" II was concerned, he thought the keenness of the station operating and maintenance staff had led to better results than would normally have been obtained.

Problems of inspection were mentioned by MR. J. EYERS (Vacuum Boiler and General Insurance) who urged more co-operation between the authority and inspectors. With large boilers, it was sometimes impracticable to carry out a full inspection at one time and it was then possible to arrange for an inspection rota for various boiler sections. Quick and effective repairs were essential and he suggested that qualified high-pressure pipework welders should be available. He also doubted the wisdom of boiler cleaning by water lancing which gave the tubes severe thermal shock.

MR. S. SHAKESHAFT suggested that the 120 MW set using reheat and conditions of 600 lb/sq in. 650° F was now a practicable proposition. The reheat boiler was now a good mechanical job, and, in his view, large plant could be built for very little more cost than the medium sizes.

The starting procedure was of great value, said MR. F. DRANSFIELD, who, however, wanted more information on the lighting up of the boilers. He also wondered if any trouble had been found with localised high-temperature areas in the superheaters. There was a critical temperature at 1,000° F at which serious trouble could begin.

MR. G. R. PETERSON (B.E.A.) approved of the originality in the staffing of the station. He had worked out the costs per unit sent out of various stations and these showed that Dunston led with 0·45d/unit.

A suggestion that failures of the joints in the reheat pipes might be due to the pipes becoming non-circular under thermal stress, was offered by MR. C. W. PARRIS (E. Green and Son), while MR. W. B. SHANNON (B.E.A.) commented on trouble with the thrusts and suggested that supervisory turbine equipment might have prevented this. Some comments on the machine design were made by MR. F. DOLLIN (C. A. Parsons) and MR. F. J. HUTCHINSON (Kennedy and Donkin) asked some questions on general operation. Criticism of the

criteria for running up the set was expressed by MR. J. F. HALL (M.V.) who quoted one machine he knew which ran up with an i.p. temperature rise of 200° F in 20 min, compared with 160° F per hour for the Dunston machines. MR. T. F. THOMAS (M.V.) wondered why the performance figures showed such consistency over winter and summer. The lower temperature of the cooling water in winter should have improved the performance. MR. T. B. WEBB (B. and W.) referred to a steam-pipe leak and explained that all they found was a small basic crack which lead to the major crack which could not have been picked up by non-destructive testing.

Finally, MR. CAMPBELL, reverting to the troubles with the reheater pipework joints, said that many people had said "only 800° F at 150 lb/sq in." and that is what the fitter probably said as well. They had had no trouble since the joints were re-made.

The authors briefly replied.

Our readers' views . . .

Taxes and Appliances

I READ with interest your article entitled "Take the Tax Off Water Heaters," but why is the Electrical Industry only concerned with taking the tax off water heaters? Surely the Industry is big and bold enough to ask that the tax be taken off all electrical appliances. It is high time that this business of having one tax on one electrical appliance, another tax on a different electrical appliance, yet another tax on one gas appliance and still another tax on a different gas appliance, should be eliminated. We should appeal for tax on all electrical appliances to be removed if we really believe that electricity has universal application.

If the Electrical Industry is going to start making representations for one appliance and then later on another appliance, it will not get anywhere and will merely confuse Whitehall. The angle should be all or nothing.

A. C. Hazel
(Managing Director)

HURSEAL LTD.,
LONDON W.1

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Lamp Tester

IN your issue of the *Electrical Times*, October 16, 1952, under the above heading your correspondent W. A. has submitted what appears at first sight to be a neat arrangement of test lamps, but I must point out a most serious defect and don't think that it should be allowed to pass without comment. Apparently two B.C. lamp holders are used with 250 V lamps, but if inadvertently a lower voltage lamp with a B.C. is used (and of course they are available down to 25 V), a dangerous situation would arise when used on 400 V. It is also noted that no 5A h.r.c. fuses are incorporated in the test prod leads which would safely interrupt the excessive current due to such an oversight. An alternative precaution would be to use B.C. 3-pin lamp holders, but I feel that h.r.c. fuses should be fitted in any case. I have seen a man severely burnt when using a 250 V and 110 V lamp in series without fuses on a 600 V traction supply due to bursting of the lamps followed by a power arc to earth.

Fully protected test lamp sets can be obtained from several reputable manufacturers, and are also strongly recommended by the Chief Safety Officer, British Electricity Authority.

R. T.

IPSWICH

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Earthing in the States

OF the two conclusions drawn in the editorial covering this matter appearing in your issue of October 16, the first seems to me to be the explanation of the second; in other words the American approach to earthing domestic supplies is due to the American use of 110/120 V for this service.

For the past thirty years I have been in close association with 110 V a.c. systems, especially as used in the West Indies where conditions are much more unfavourable than in the States; for not only are standards of workmanship generally lower, but West Indian users are more vulnerable to shock, being often barefooted and always moist from the steamy tropical climate. During the whole of the above-mentioned period I have never heard of a single fatality from the 110 V supply, and any shocks received are very little thought of. This, I consider, explains the opinion so often expressed on the other side that earthing 110 V systems is unnecessary if not undesirable, and also that 230 V a.c. is too high a voltage to introduce into the home.

L. B. Whitaker

OXSHOTT

Standardising Distribution

Distribution Engineering Under Nationalisation is Reviewed in N. Midland I.E.E. Centre Address

CAREFULLY handling what has often proved to be a provocative subject, Mr. H. S. Moody, B.Sc.(Eng.), A.C.G.I., M.I.E.E., chairman of the North Midland Centre, I.E.E., presented in his address a survey of distribution engineering in a nationalised electricity supply industry. His main concern was with the possibilities of standardisation, which he considered as one of the potential advantages offered by nationalisation.

Network Planning

In the field of higher voltage distribution networks, the advent of nationalisation gave opportunities for planning not previously available to the same extent. Before vesting day supply to densely populated areas was largely undertaken by local authorities, other districts being more generally served by companies. Those companies, operating selected generating stations, showed a tendency to limit their demand on the Grid. It was found instead more profitable to install sub-transmission networks.

Under nationalisation these networks prove to be uneconomic, as inter-undertaking boundaries having now disappeared, areas are split into load zones, each being fed from one or two Grid points. This sectionalisation makes effective planning a practical possibility with resultant saving in materials.

In considering the selection and installation of plant the reinforcement of the higher voltage network is of prime importance. Work is at present in hand in an attempt to design outdoor substations for 33 kV and 66 kV on a standard basis. Although some measure of standardisation is possible, variations in site, circuit requirements and equipment preclude the possibility that all higher voltage substations will be exact replicas.

Yet there is little doubt that, if full advantage is to be taken of nationalisation, standardisation to a large extent of our engineering work is desirable. Much time is being devoted to this end, as shown by the consideration being given to switchgear. Although little of practical value has so far resulted, it is hoped that, within the next year or so, British Electricity Specifications will be issued to cover all normal requirements. This has already been done for transformers up to 1,000 kVA and for major substations the Board has adopted two standard sizes.

Although solid insulation type cable manufacture for voltages up to 22 kV has been standardised for several years, for higher voltages neither of the two cables at present available—oil-filled and gas-filled—hold any real economic advantages over the other. Perhaps the greater difficulty in selecting cables is due to rapid fluctuations in metal prices. Aluminium sheathed cable had had many advantages to offer the purchaser, but recent increased prices of aluminium had considerably reduced its gain over lead sheathed cables.

Aluminium Cable Cores

Aluminium is now an attractive possibility as conductor material for both underground cables and overhead distribution lines. Although this idea has been mooted for many years, only recently has it become economically advantageous to put aluminium to this use. With certain types of conductor the saving amounts to about 13%, and the Board is planning installations with these cables.

Economic conditions are now dictating the use of aluminium conductor in h.v. overhead line networks, where previously copper had had pride of place. The saving in expenditure as a result has been as much as 17% for 0·1 sq. in. conductors in 11 kV lines. It is necessary to emphase the need for reducing expenditure on lower voltage distribution. As this outlay forms a large part of the total, a small percentage saving can help to offset expenditure on higher voltage equipment.

Standardisation of poles for l.v. distribution is covered in the main by B.S. 1320, and this design has been generally adopted. For use on other lines not applicable to the standard, the Board has in use a suitable pole, based on B.S. 1320. For 66 kV systems, in addition to the inexpensive wood pole portal design, a simpler type pole using post type insulators is being developed, although it is so far unproven.

Notes on Wiring
by MEGOHM

Points to Consider

Further Notes on Aluminium Conduits and Fittings

IN his letter published in the *Electrical Times* on October 9, Mr. French of Messrs. F. C. Blackwell and Co. says he would like to contradict some of the statements made in my article, "An Aluminium Study," and Mr. Bailey of the Aluminium Development Association in his letter published on October 16 says Mr. French's letter goes a long way to correcting some misapprehensions that may arise from my article.

Let me hasten to say my intentions at all times are to report facts, and it is doubtful if any misapprehensions can arise from the contents of the above article among installation engineers who have first-hand knowledge and experience in the installation of conduit systems.

Availability

In reference to availability of supplies I find from inquiries made in the London area to a large manufacturer and wholesaler that the manufacturer has discontinued the making of aluminium conduits and fittings and the wholesaler is not carrying stocks of this type of conduit and fittings. A further inquiry to another large conduit manufacturer disclosed that the only aluminium conduit available in his stock was 1 in. diameter and other sizes and fittings could not be supplied at present.

I am at a loss to understand how Mr. French can say my article implies that B.S.I. are not working on a specification covering aluminium conduit and conduit fittings. I believe what is written is perfectly clear and correct, that the I.E.E. Wiring Regulations Committee are of the opinion that until such time as the E.R.A. Report, based on practical tests is available, it would not be wise to *publish* a British Standard for aluminium conduits and fittings.

No one will dispute Mr. French, when he tells us that if certain precautions are taken an aluminium conduit system can give good service, but it must also be appreciated that these "certain precautions" add to the cost of installing the system.

Mr. French also tells us he sees no reason why aluminium conduit and fittings should not be marketed at prices as favourable as steel or in many instances even more favourable. Well, let us examine this statement and compare prices published by Members of the Association of Steel Conduit Manufacturers.

	Aluminium	*H.G.S.W. Steel B.E.*
100ft of ¾in. diameter conduit costs	£4 18 5	£2 10 3
100ft of 1in. do.	£6 9 0	£4 0 1

Maybe when the E.R.A. Report is published and costs of aluminium conduits come down to the favourable prices anticipated by Mr. French the position will require further consideration.

I am very pleased to note that Mr. French supports me in attaching the utmost importance to marking clearly on aluminium conduit and fittings the appropriate specification number.

From Mr. Bailey's letter it appears that he agrees with the observations I made that it would not be wise to publish a British Standards Specification until the E.R.A. Report is available and no one in the electrical contracting industry, I venture to suggest, will disagree with him when he says proper installation technique is necessary for aluminium conduit systems to avoid failure in service.

Amendment No. 1, December, 1951, to the Codes of Practice Document No. 321·101, I agree with Mr. Bailey, gives useful information on installation technique and perusal of this document should leave little doubt of the precautions to be taken when installing aluminium conduit systems.

The example given that a reading of 0·15 ohm was obtained over a 12 yards conduit run can hardly be considered as conclusive evidence that in general an aluminium conduit system is equal to a steel conduit system in mechanical strength and rigidity and for long and satisfactory service under varying conditions. Mr. Gilbert, in his letter of October 23, has raised interesting points in inquiring if Mr. Bailey considers a resistance of 0·15 ohm for a 12-yard run good and the method used for testing.

THE 66th DAIRY SHOW

Clean Milk Production & Supply

TO judge from the continuing and increasing demand for rural electrification the farming people of Britain have long been aware of the importance to them of the assistance that electricity can offer in making their life's work more satisfying and efficient.

Now an established event in the farming year, the Dairy Show, 66th in the series and just concluded at London's Olympia, bears much evidence of the progress effected in the continual search for perfection in farming machinery and appliances.

Excellent examples of the way electricity is aiding this drive to perfection were many.

Rotational grazing of both the birds and the animals can be controlled by the systems of electric fencing that are freely available to farmers and poultry keepers. Notable examples at the show were those of the Wolseley Sheep Shearing Machine Co. and the Harvest Saver and Implement Co. These dissuade the stock from straying by the use of cables carrying low voltage electric currents.

However, in winter time the problem of feeding the stock is made more difficult by the lack of natural grazing and thus the farmer must concentrate on providing fodder from the barn store and silo. The barn machinery of interest in this sphere includes examples of automatic hammer mills and in sack grain drying plant. Such plant includes the Wizard automatic mill by E. H. Bentall Ltd., the Essex Major and Briton mills by Christy and Norris and the units by Fyna Industries. For ease in handling the sacks the electric hoist equipment of Geo. W. King should be included in any plan for electrification.

Two interesting exhibits at the Show: The N.C.B. Electric "Percheron" 25-cwt. 125-gallon dairy truck, with 20-25 mile range, and the new Purlac in-churn milk cooling unit which incorporates turbine cooling heads

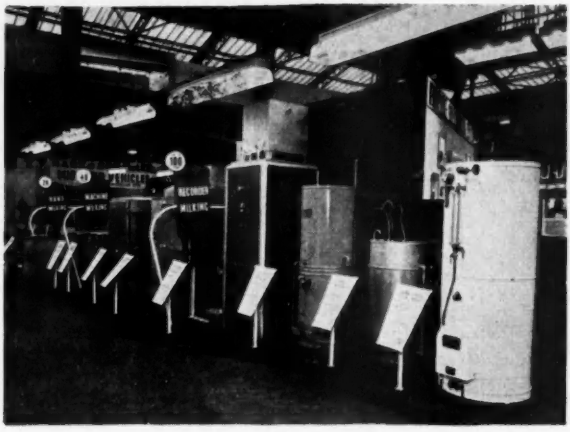
In view of this interest in crop drying the Aerofoil fans made by Woods of Colchester Ltd., and combined with G.E.C. duct air heaters for in-bin and platform grain dryers shown by the General Electric Co., Ltd., are particularly important.

The milking equipment on show was extensive and varied and the farmers themselves know which type has proved in their experience most suitable to their own particular herds. It is notable that most of the installations can be powered by electricity.

In the production of first grade milk, cleanliness is indeed next to godliness and the sterilising equipment shown by G.E.C. and J. W. Woolley & Co. Ltd., *inter alia*, show the immersion type and block methods of steam raising in sterilisers. Barford (Agricultural) Ltd. are specialists in steam raising equipment and amongst their exhibits were electric boilers.

Milk cooling plant is featured widely by the many well-known firms in the refrigerating industry. Purlac Equipment Ltd. showed new developments in milk cooling plant. Their immersion coolers have a lifting gear which permits the full churns to be hooked up, lifted from the floor, swivelled into the tank without effort, and vice versa. They also have a circulating cabinet connected to a tray on which the churns are cooled by means of one or more turbine cooling heads.

The Pressed Steel Co. "Prestcold" exhibits include the new model CW150 chilled water milk cooler, a dairy cold room of 200 cu ft, with thermostatic control, and a four-churn immersion milk cooler Model MC 41.



The E.D.A. stand is always the cynosure of visiting eyes with its display of the Industries' best. Here are seen many of the steriliser units and water boilers which were shown

The most economical and efficient vehicle for the delivery of milk and dairy products is by far the electric vehicle and consequently the builders of these vehicles have taken the opportunity to meet their dairy farmer friends. Exhibits range from the pedestrian controlled models for use in small delivery rounds and in the depot such as the Graiseley models by Diamond Motors (Wolverhampton), the Electruks by T. H. Lewis Ltd. and by Sidney Holes Electric Vehicles to the 10 cwt Midland Vehicles' "Vandot," with Midland coachwork, the Brush "Pony" models, the Morrison Electricars by Austin Crompton Parkinson Electric Vehicles, Helecs' new 30 cwt Endeavour chassis and the range by Smiths Electric Vehicles to which we made reference in our report of the recent Commercial Show.

Examples of storage batteries at the show were those by the Tudor Accumulator Co. and the D.P. Battery Co. Westinghouse Brake and Signal Co. demonstrated the progress made in battery charging equipment at their stand. Two very old copper-oxide chargers, a 22-year-old twelve-circuit unit and a pre-1930 charger were compared with the firm's latest streamlined unit.

MOTOR ELECTRICS

VISITORS to the International Motor Show are all too often drawn to the central display by the member firms of the Society of Motor Manufacturers and Traders, showing the sparkling streamlined and efficient examples of the engineers' craft and the designers' prowess.

Equally important are the sections in which the manufacturers of accessories and components have their displays.

New items this year include the Kingsbury "Surestart" unit for easy starting in cold weather by Autocar Electrical Equipment Co. Delco Remy and Hyatts new oil-filled ignition coil for 6 or 12 V circuits, and the new C.I., speed coil made by Commercial Ignition and giving an extra high tension spark. Many new lighting accessories include tail-lamps and fog lamps by Pritlers Ltd., the tail-lamps having two lamps in parallel; the new Farmlite lamp and the 2019 tail-lamp by Desmo Ltd. and a range of accessories by Joseph Lucas including the SLR7008 long-range driving lamp which is now available on the home market. William Clark (Spare Parts) Ltd. show amongst other things a time switch for parking lights which is said to be a version of the Venner Time Switch.

In the transport servicing section new electrical introductions include a 5-ton hydro-electric four-post car lift by Joseph Bradbury and Sons; an improved type 2E electrically operated cleaning tank by Mann Egerton; the "Speedylectric" steam jet cleaner by G. T. Riches and Co., Ltd. who also feature the Standard Startall; Triangle Products' latest spot-gun welder for 200/250 V a.c. supplies operating at the rate of 1 ft per min.

Crypton Equipment again feature their new B.300 engine analyser amongst other units and also a new range of bench mounting metal rectifier chargers and two new Home Battery Chargers for charging 6 V or 12 V units at 2½ and 5 A respectively.

Battery units on show include Young Accumulators' new 12 V 9-plate low-type battery for the Ford Consul and Zephyr cars, selections from Chloride Batteries' recently augmented range and Peto and Radford's Dagenite Dual-Life batteries.

E. K. Cole Ltd., who are concerned with comfort in motoring in a different way, have in their display the new CR181/F radio set introduced for installation in the dashboards of the Ford Consul and Zephyr models.

RESEARCH and ILLUMINATION

Dr. J. W. T. Walsh describes twenty years development in Utilisation Section Address

THREE outstanding developments in illumination engineering were selected for special mention by DR. J. W. T. WALSH, O.B.E., M.A., D.SC., M.I.E.E., in his inaugural address as chairman of the I.E.E. Utilisation Section. All have taken place within the last twenty years, and they concern, respectively, the primary standard of light, the development of a colour-independent photometric scale, and the measurement of colour.

Dr. J. W. T. Walsh

It was not until 1931 that a move was made towards the development of a practicable standard of light based on the emission of a black body. A difficulty was that the rate of change of luminous intensity with temperature is very great; about $\frac{1}{2}\%$ at 2,000° K. Thus temperature measurement proved a difficulty. However, in the standard finally evolved (Fig. 1) the ruse of defining the temperature as the melting point of platinum was adopted. With the platinum heated in an h.f. induction furnace, the temperature is gradually brought down until a point is reached at which the illumination remains constant for some time. In this condition the luminous intensity of the radiator is by definition precisely 60 candelas/cm².

One drawback to the standard is its comparitively low temperature, 2,042° K. There is a considerable colour difference between the standard and modern light sources. If iridium (melting point 2,700° K) could be substituted for platinum this objection would disappear, and some experimental work has already been conducted along this line.

Photometry

The development by the C.I.E of a unique photometric scale, independent of colour, has given effectively a standard sensitivity curve for the human eye. This makes it possible, at least theoretically, to devise an absolute photoelectric photometer. Amongst such devices, the most elegant at present available is the dispersion-and-mask photometer. In this, the light to be measured is dispersed, generally by a prism, and the correction factor required at each wavelength is applied by means of a mask or template placed over the spectrum so formed, and having a shape calculated from the sensitivity curve of the photo cell used. The light passing through the template is recombined and measured by means of the cell.

So far as the measurement of colour is concerned, there is a C.I.E. "standard colorimetric observer," whose behaviour in matching colour mixtures is completely specified in tables. These are at present being recalculated by the National Physical Laboratory using a much larger number of observers than was originally employed. It is interesting to note that with three templates of appropriate shapes (corresponding to the three C.I.E. reference stimuli) the absolute photometry instrument mentioned above can be used as a colorimeter.

Research

Having dealt with these major advances, Dr. Walsh proceeded to a more general consideration of research into illumination engineering. He mentioned street lighting and glare, and then went on to the investigations necessary for a code of illumination values. In the experiments carried out by H. C. Weston, a more or less exacting visual task was performed at

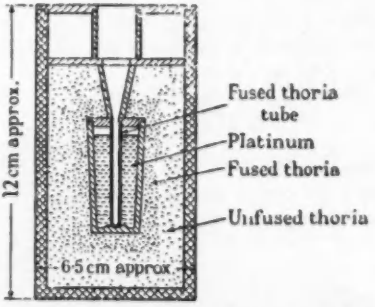
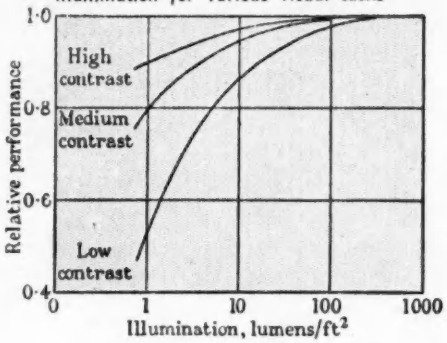


Fig. 1. The primary standard of light

different illuminations by a group of subjects, and average performance, in terms of speed and accuracy, was calculated. There were two stages—in one case only the size of the components used in the test was varied, in the other the contrast also was changed (e.g., black or grey ink on papers of different reflection papers). Fig. 2 shows some results.

Fig. 2. Relation between performance and illumination for various visual tasks



Maximum Performance

In all cases it was found that a value of illumination existed at which performance reached a maximum, and at considerably lower values of illumination performance was still a high percentage of the maximum. Weston suggested that illumination to give 90% of the maximum performance should be adopted, and the code issued by the I.E.S. in this country is based on this proposal.

RELIABLE BREAKER SERVICE

EXPERIENCE has shown that for arc-furnace control the performance of air-blast circuit-breakers is more satisfactory than standard oil circuit-breakers. Characteristics inherent in the design of the former are responsible for their superiority in the arduous duty required for the adequate control of arc furnaces. Oil circuit-breakers when used for this work were found to require considerably more maintenance due to rapid contamination of the oil resulting from the frequent operation of the breaker under fault conditions. During the last war it was felt that the air-blast circuit-breaker combining the advantages of flexibility and lightness of moving parts, would prove more suitable for the control of arc-furnaces then being built in large numbers for the manufacture of special steels.

Recent inspection of a 6·6 kV, 150 MVA, 800 A air-blast circuit-breaker manufactured by the English Electric Co., Ltd., for the Brymbo steelworks in Wales has shown the wisdom of that choice. As the accompanying illustration shows, after their ten years in use the contacts exhibit little sign of wear and are, in fact, being re-fitted when the breaker is re-assembled. The breaker was installed in 1940 and apart from two years immediately after the war when the furnace was out of commission, has given trouble-free service. During the last 13 months it has been in continuous operation with the minimum of maintenance.

Not only the contacts have withstood this severe test. The pneumatic parts of the circuit-breaker are also in excellent condition and working order. When the circuit-breaker is refitted the whole equipment is being returned for service without any replacement necessary.

This untouched illustration shows the almost perfect condition of the contacts

Problems and Practice

IN ENGINEERING

Ups and Downs

WHILST investigating a lighting fault recently I discovered some unorthodox wiring causing unusual conditions.

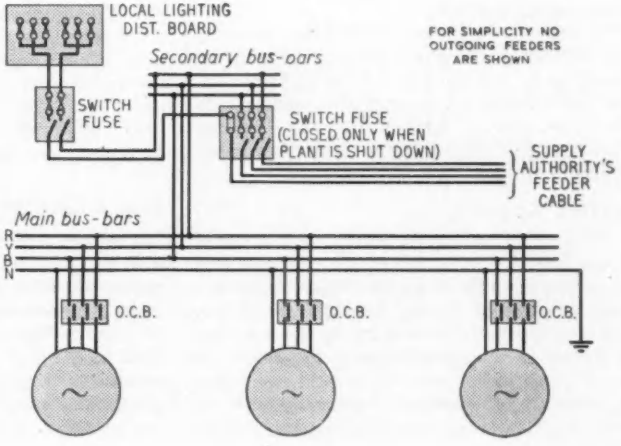
The trouble occurred in a factory and the complaint was that the power house lights were varying in brightness (the factory has its own generating plant). One look showed that the lights were varying from bright to dim steadily one or two periods per second.

A voltmeter was procured and readings, taken at the local distribution board, indicated that whilst the voltage between live and earth was perfectly constant, the voltage between live and neutral was varying considerably.

The distribution board feeders were then traced back and the connections were found to be as shown in the diagram. At this point the cause of the trouble became apparent and was confirmed by a voltage reading, taken between neutral and earth, which showed 13·5 V (on open circuit).

The lights had been connected so that the return path of the current was via the Supply Authority's neutral to the substation and then back through earth to the earth plate on the factory neutral conductor. The fluctuating voltage was obtained because the factory alternators were running about one or two cycles per second below grid frequency and as the 13·5 V on the neutral was derived from the grid it alternately assisted and opposed the nominal 230 V from the private plant giving a resultant voltage which varied between 243·5 and 216·5 at the difference frequency; i.e. one to two cycles per second.

The remedy, of course, was simple. The lighting neutral was transferred to the factory neutral bus-bar. It will be seen, however, that when current is being taken from the Supply Authority any out-of-balance current must flow via the earth path to the substation. To correct this the switching arrangements should be altered, the Authority's neutral being connected to the factory neutral, removing the local earth connection when the private plant is shut down.—*Jas. Garside.*



Connections of distribution board feeders showing wrongly connected neutral

Cage Rotors

THE rotors of "cage" induction motors are sometimes described as being indestructible, but over a period of years the writer has had to deal with about a dozen cases of breakdown to cage rotor windings.

In most cases the trouble was due to a bar or bars from one or both end rings being loose and causing vibration to be set up as a result of the unequal current distribution in the bars. In these instances, the line current became unbalanced, the slip increased and the torque fell, being particularly poor at starting. One 3 h.p. motor driving a fan would not start at all with the fan coupled but would run up to speed on no-load only. On opening up this machine, it was found that almost all the conductors were broken away from one ring. After the conductors were re-brazed to the ring the machine was quite satisfactory in operation. Cast end rings are to be preferred to brazed rings, one type, which has the bars, end-rings and fan blades cast in one piece, can be considered virtually indestructible.—*S. Woodhouse, A.M.I.E.E.*

ASH AND CLINKER IN INDUSTRY

Institute of Fuel Conference Emphasises Importance of Better Use of Low Grade Fuels

THE effect of ash and clinker on the performance of boilers is a subject which affects directly or indirectly most large industrial concerns in this country, and, with the growing trend towards the production of coals with increasing ash content, is a subject of ever-increasing importance.

For these reasons, the Institute of Fuel held an Opening Conference on "A Special Study of Ash and Clinker in Industry" at the Institution of Mechanical Engineers on Tuesday and Wednesday of this week.

To the electricity generating industry the first paper of direct import was that on "Handling and Disposal." This divided the mineral matter in coal into three groups: shales, which were largely complex alumino-silicates; compounds high in iron or calcium such as pyrites or calcite; and, lastly, the inherent mineral matter contained as part of the original vegetation of which the coal was formed. The effect of these mineral deposits on several types of grate under different conditions of burning was discussed with particular reference to pulverised fuel burning. It was pointed out that clinkering often arose because of inattention to direct observation of furnace temperature with p.f. firing, and that too much reliance should not be placed on CO_2 readings, as these could easily be upset by boiler-casing leakages.

In slag tap furnaces and cyclone furnaces, the furnace construction had to be able to stand up to the temperature of molten slag, and fuels having a low ash-fusion temperature should be chosen. Methods of ash disposal were not dealt with in detail due to the number of local considerations involved.

Boiler Deposits

Dr. H. E. Crossley, in dealing with external boiler deposits, investigated the chemical and physical properties of fly ash. The commonest form of external fouling on steam-generation and superheater tubes was due to the bonding of fly-ash in a matrix of inorganic salts. The main constituents of this matrix were the sulphates and sometimes pyrosulphates of sodium and potassium, accompanied by smaller quantities of iron and aluminium sulphates derived from reactions between the matrix and the fly-ash.

When the matrix consisted of pyrosulphates it could be expected to grow rapidly, as these salts were semi-molten when the boiler was operating and fly-ash collected on the sticky surface. The normal sulphates melted at much higher temperatures and they could be expected to remain solid except on the hottest heating surface.

The author thought that the oxidising action of the acid sulphates was a potential danger to boilers designed to attain a final steam temperature of 1,050° F if such boilers were liable to such deposits. In most boilers, the temperature of the outside of the superheater tubes was too low to permit a chemical slag reaction, but when the steam temperature was 1,050° F, the outside of some of the tubes would be at 1,100° F, at which temperature the reaction could take place with consequent tube corrosion and wastage.

In a previous paper the author had put forward evidence to show a correlation between the severity of deposits in stoker-fired boilers with the chlorine content of the fuel. A geographical analysis had now shown that power stations suffering from alkali-matrix deposits all lay in the Midlands, Lancashire and Yorkshire, where high chlorine content coals were used. Experience has also shown that in high chlorine content fuel areas even pulverised fuel firing did not preclude the formation of deposits.

The author concluded with some remarks on phosphatic deposits.

Plant Design

The effect of ash content on plant design was the subject of Mr. W. F. Simonson's paper. Here he pointed out that the development of pulverised fuel firing had been largely dictated by the need to use low-grade fuel. The mechanical stoker found its limit of applicability at a boiler output of 250 to 300 klb/hr, but boiler designs had been brought out to deliver 830 klb/hr with pulverised fuel

firing. He gave details of the development of boilers with high availability for operation on high-ash coals. Dealing with the slag-tap furnace, he stated that this type required consistent supplies of bituminous coals of low ash-fusion temperature, and a further prerequisite was continuous operation under base load conditions. Given these desiderata, the design offered advantages in the appreciable reduction of the quantity of ash carried forward through the boiler in the form of fine dust, with its accompanying problem of collection and disposal. Experience had shown there was no reason for misgivings originally expressed, arising from the possibility of volatilisation on the molten ash bed of the phosphorus and chloride constituents of the coal. He concluded by giving some details of the design and development of superheaters, boiler tubes, economisers and air preheaters, and mentioned that the presence of ash in the flue gases could lead to increased fan running charges and heavy maintenance costs due to the abrasion of fan blades.

Dr. A. C. Dunningham considered in detail the various effects of ash upon the thermal and economic efficiency of a boiler plant. These could be considered under two headings: (*a*) loss of heat in unburnt carbon and sensible heat in ashes (direct and calculable); and (*b*) reduction in output and efficiency due to poor combustion and longer outages and higher maintenance charges arising from boiler deposits and corrosion (indirect effects).

With regard to the first, available experimental data were mainly confined to water-tube boilers working under more or less standard conditions. As far as the second was concerned, again little was known. The paper then investigated the evaluation of coals, quoting three methods.

Using High-Ash Slurries

In Mr. F. B. Karthauser's paper, the problem of utilising high-ash coals, particularly coarse middlings and wet fines, was looked into. Attempts were being made to render slurries suitable for firing on chain-grate stokers in shell-type boilers by removing some of the surface moisture. This required extra drying plant, and although it might be commendable as a temporary method, it did not appear to be a general solution. The stickiness of slurries stopped them from flowing freely out of normal bunkers and stoker hoppers, and they could not, therefore, be fed mechanically on to chain grates. Hand firing had been sometimes adopted, but even then it did not appear that the chain grate was the right machine for the task. Although at first sight pulverised firing seemed ideal, slurries would need to be dried before they could go into the orthodox mill.

Special feeding mechanisms and furnace designs were therefore necessary. Continental types of plant had been developed, using multiple screw feeders and cutters, and this type was at present under trial at a north-western colliery.

Ash and the Gas Turbine

Intensive work is proceeding both in this country and abroad on the use of coal fuel for firing gas turbines, and some of the difficulties associated with this were described by Mr. T. H. Hurley. In closed-cycle machines, the problem lay in the deposits which formed in the air heaters. Under normal conditions the ash should not give any more trouble in the "air-boiler" of a gas turbine than is already experienced with water-tube boilers, although the temperature would be somewhat higher. Again in the exhaust-heat cycle the problem lies in the heat exchanger.

In the open-cycle, however, the ash passed through the turbine blading and affected the performance of the machine. Dust separators could be placed between the combustion chamber and the turbine, and preliminary reports were optimistic on the efficiency of these. Even when the dust was removed, ash gave rise to problems of combustion chamber design, and progress in this country was being made with a cyclone-type, water-cooled chamber.

Other methods of avoiding ash were to gasify the coal under pressure and use this gas in the turbine as a fuel.

CONFERENCE PAPERS

Origin and Nature of Ash: Sampling and Analysis. L. J. EDGCOMBE and A. B. MANNING.

The Mineral Matter in Coal and its Relation to Coal-preparation Problems. A. GROUNDS and A. M. WANDLESS.

Ash and Clinker in Practice—Handling and Disposal. W. G. MARSKELL and C. W. PRATT.

External Boiler Deposits. H. E. CROSSLEY.

The Design of Plant as Affected by Ash. W. F. SIMONSON.

Ash and Boiler Efficiency. A. C. DUNNINGHAM.

The Effect of Ash on the Performance of Shell Boilers. E. J. MACDONALD and M. V. MURRAY.

Utilisation of High Ash Coals. F. B. KARTHAUSER.

Ash and Atmospheric Pollution. A. FITTON.

The Influence of Ash on the Operation of Gas Producers in the Gas Industry. L. G. TOWNSEND.

Ash and the Coal-fired Gas Turbine. T. F. HURLEY.

Bonded Deposit Problems

Investigations described in Fuel Research Report

INVESTIGATIONS into boiler operation and gas turbine working have a prominent part in the report of the Director of Fuel Research for 1951, which has recently been published.* Particularly interesting to the supply industry are the trials carried out at power stations to investigate the effect of volatile alkali in coal, in relation to ash content. on the formation of bonded deposits in boilers fired with pulverised fuel. Three generating stations were concerned; one burning coal with a low chlorine content and a medium ash content; the second high chlorine, high ash; and the third, high chlorine, low ash.

The expectation was that only the third station would suffer from bonded deposits, on the theory that high ash content would "dilute" the material which caused bonding. In the event the tests were inconclusive, though there were indications that the expected course was being followed, when an interruption in the supply of the selected coal supervened. It is planned to repeat the tests as soon as possible.

Tests at Burton-on-Trent have shown that the availability of a stoker-fired boiler can be improved by limiting the power supply to one uniform grade. This effect has been confirmed at another station, where coal with a high chlorine (over 0·3%) and medium sulphur content (1·3 to 1·8%) was used. Work is continuing to find a reason for this comparative freedom from deposits.

Gas Turbines

Experiments on gas turbine designs have made use of a vortex combustion chamber for coal firing, which has given efficiencies of combustion up to 92%, and of a straight-through combustion chamber. This latter unit has been used to supply hot dust-laden gases to test a tubular heat exchanger. The gases, which were not cleaned, were produced by the burning of coal containing some 10% ash and, they entered the heat exchanger at 850° C. A large proportion of the deposition in the exchanger was upon the tube plate, and it was found possible to run for several hours before the pressure drop across the tubes became excessive. Further it was found possible to remove the deposits in the tubes, by soot blowing for a few minutes with steam at 100 lb/sq in. Work is now to be carried out on suitable dust extractors to reduce the amount of ash in the gases.

Investigations into the part played by vanadium compounds in promoting the formation of oxide-scale on heat-resisting alloys has progressed with the aid of x-ray equipment and spectrographic techniques. It has been found that the presence of about 0·1% of zinc or magnesium in the oil burnt in gas turbines produces a marked reduction scale formation, and experiments have been made with zinc oxide, magnesium oxide and magnesium carbonate as possible additives.

Domestic Fires

One interesting development in the testing of open solid fuel fires was the change from a "cold-to-cold" basis to a "flying start" routine. In the first method a fire is lit, refuelled once, and then allowed to die out, its performance being averaged over the whole of the time it is alight. In the second, the appliance is allowed to become fully warmed-up, and its performance is then averaged out over a six-hour period during which refuelling takes place at regular intervals. New measurements have been made to determine the "flying start" efficiency of a number of designs of open fire.

During the year under review the calorimeter building of the Fuel Research Station came into use. One of the experiments made in it compared, at the request of the B.E.A.'s Research Council, the rates at which the air in a room is warmed by convective and radiant heaters of the same power. Using 2 kW heaters, it was found that at the end of one hour the temperature inside a room was nearly 2° F higher with a convective source than with a reflector type fire, and this difference persisted over the remaining seven hours of the test.

Amongst the many other interesting matters discussed in the report may be noted a progress report on the measurement of atmospheric pollution, some new design information on the Fulham-Simon-Carves ammonia process for removing sulphur compounds from flue gases, and a short survey of the occurrence of germanium in coal. In this last respect, it may be mentioned that the element has only the same concentration as in other sedimentary rocks.

* *Fuel Research 1951. H.M.S.O. price 2s. 6d.*

Electric Horses for British Railways

FOLLOWING successful tests with a prototype "electric horse" built by Austin Crompton-Parkinson Electric Vehicles, Ltd., one hundred of these tractors are to be put on the roads at 16 cities and towns throughout the country in a large-scale experiment to obtain full operating and performance data.

The vehicles themselves are directly interchangeable with the existing petrol-driven mechanical horses which are a well-known sight in this country. They are four-wheeled articulated tractors, and can carry a 2½-ton payload. With a normal range of about 25 miles they have a maximum speed on the level of 18 m.p.h. and can climb a 1 in 9 gradient with a full load.

The motor is of 12½ h.p. at a 1-hour rating and drives the vehicle through a fully floating rear axle with spiral-bevel drive; the reduction ratio is 6.57 to 1.

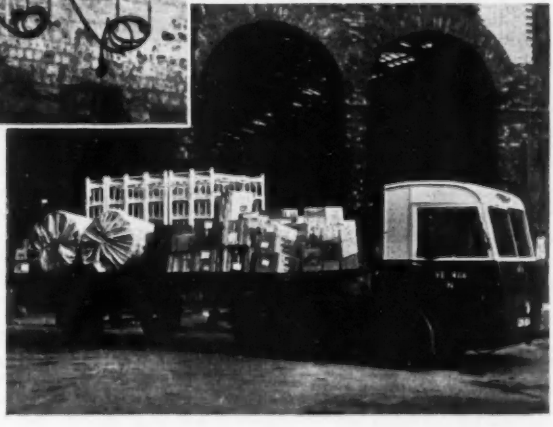
Control is exercised through a five-stage solenoid-contactor, operated by an automatic delayed-action foot switch giving five forward speeds and reverse, sequence controlled. Four of the speeds are with the batteries in parallel, the first three incorporating resistance control. Operation of an independent foot switch introduces the series circuit for the fifth speed for straight running without stops. Thus two economical running speeds, parallel and series, represented by the fourth and fifth stages. A hand operated switch selects forward or reverse.

The traction battery is split into two sections mounted in crates suspended one on each side of the frame. With a total number of 48 cells, the battery has a rating of 200 ampere-hours on a 5-hour basis, and a voltage of 96 volts.

The cab is coach built and fully enclosed, giving the driver easy access and good vision.

It is believed that the cleanliness, simplicity of operation, easy maintenance and freedom from starting difficulties, will make the electric "horse" an attractive unit for much of the work to be carried out on local distribution.

Towns at which these vehicles are to go into operation are Hull, Harrogate, Scarborough, Leeds, Newcastle-on-Tyne, Middlesbrough, Bishop Auckland, Welwyn Garden City, Ponders End, Grimsby, Spalding, Newport (Mon.), Nottingham, Derby, Croydon and Brighton.



Above is one of the "horses" in the "stable," showing the simple arrangement of charging rectifiers. On the right, a loaded tractor moves out. The good arrangement of the cab is well seen in this view as well as the convenient and unobtrusive battery location at the rear of the horse

overseas news

Ratification in Fremantle

Two Bills, one to ratify the sale of the Fremantle electricity undertaking to the State Electricity Commission and the second to apportion the purchase price, were introduced in the Western Australian Legislative Assembly a few days ago. Mr. Brand, Minister for Works, explained that the first Bill provided for ratification of the agreement between the Commission and the municipality on the purchase of the undertaking. The agreement would remain in force until 1967, he said, and until that date the Fremantle Electricity Board would act in an advisory capacity in the distribution of electricity in the district which it had previously served. It would also be entitled to one representative on the Commission. The other Bill is to ratify the agreement made between the Fremantle city council and the East Fremantle municipal council over the division of the purchase money, in accordance with details which we have already noted in these pages.

Queensland Revenue

Queensland's four regional electricity boards are expected to yield a revenue of £2,208,045 this financial year, according to a recent announcement by the State Electricity Commissioner Mr. Neil Smith. This compares with a total of £589,191 for power supply authorities in the same areas for the year 1945-46. He gave the comparative figures for each board as:—

Regional Board	*Revenue* 1945-46	*Est. revenue* 1952-53
Wide Bay-Burnett ..	£122,844	£463,600
Capricornia	£124,598	£470,600
Townsville	£183,153	£737,845
Cairns	£158,596	£536,000

The increases reflect the big increase in demand and in distribution network, he added, while a grid system linking the major power stations in Queensland was a long-range objective.

Electrification or Dieselisation?

Should the main western railway line out of Sydney to Lithgow, N.S.W., be converted to diesel-electric operation instead of straight electrification, as originally proposed? That is the subject of debate in New South Wales these days following the State Government's decision last month to suspend work on the £4,000,000 electrification of the line to Lithgow, and the statement by Mr. R. Winsor, Commissioner for Railways, asking the Minister for Transport to hold an inquiry into the relative merits of diesel-electric and steam and electric traction. Mr. R. E. Purves, chairman of Clyde Industries Ltd. (local suppliers of diesel-electric locos), has stated that his company has been trying to convince the N.S.W. Railways for some years of the advantages of his firm's locomotives. But Mr. R. W. Campbell, general manager of Australian General Electric Pty. Ltd., who, he claims, is the largest supplier of both diesel-electric and straight electric locos in Australia, believes that for the particular conditions existing in the Blue Mountains route, straight electrification is the answer. With the N.S.W. axle load it is only practicable for a diesel-electric loco to have a rating of 1,500 h.p. (and would cost about £110,000), whereas an electric locomotive of the same physical dimensions and axle loading could have a rating as high as 3,750 h.p. (and cost only £63,000). The increased number of diesel-electric locos would more than offset the cost of o.h. distribution of the electric locomotives, while the overall maintenance and running costs of the latter are lower than for diesel-electric, he said.

Brisbane's Plant

All heavy equipment needed for the Brisbane City Council's £1 million packaged electricity plant has arrived at that city. Last of the material—two 42-ton condensers, reached there from New York a few days ago. They will complete the 10,000 kW "package" plant, designed to help Brisbane through next winter's peak electricity demand, and now efforts are being organised to ensure that the plant is put into operation as quickly as possible.

Seaway Decision Awaited

The go-ahead signal for an all-Canadian $300,000,000 power project on the St. Lawrence may come within the next few weeks, according to Mr. R. Saunders, chairman of the Hydro-Electric Power Commission of Ontario. The last public meeting of the International Joint Commission took place on October 20. Earlier this month detailed consideration was given by that Commission to the engineering design for the works required, we learn.

B.C.'s Water Power

British Columbia's opportunity to develop its own industries will be threatened if the Government grants the Atlin Lake power rights to the Aluminium Co. of America, according to Mr. E. T. Kenney, former minister of Lands and Forests. The British Columbia Government has not yet dealt officially with the proposal of Alcoa to establish a $400,000,000 aluminium plant near Skagway, just across the border from British Columbia in Alaska. To carry out such a programme it would be necessary to dam Atlin Lake. Mr. Kenney maintains that the same watershed could be used for power development entirely within British Columbia and should be retained

for that purpose since Atlin Lake is solely within Canadian territory.

Sales Outlook

The gross selling value of electrical appliances produced in the Dominion during 1951 amounted to nearly $700 millions it was stated at the annual meeting of the Canadian Electrical Manufacturers Association held earlier this month. Another feature on the bright side to which reference was made was the major plant expansion being undertaken by various manufacturers, totalling some $35 millions this year. But on the more gloomy aspects, the threat of U.S. competition, and the incidence of price cutting, particularly in the metropolitan areas, is evidently worrying the manufacturers. The banning of resale price maintenance has damaged manufacturers' prestige, they claim. The industry favours an early review of the problem by the Government and reinstatement of price maintenance. But it seems that the feeling was that present price cutting practices could not get much worse. About 15% of the production in the apparatus branch has been earmarked for defence and about 25% in the electronic branch. After completion of prototyping and the experimental contract clarification stage, the percentage in the latter branch is expected to go much higher. Generally, the material supply situation appears adequate, and taken overall, the general outlook for appliances sales was considered good.

Winnipeg Offer Expected

In Winnipeg a second special power session of the Legislature may be called before the end of the year if the Manitoba government reaches an agreement with the Winnipeg Electric Co. to buy its power plants. From reports it seems likely that the government will make an offer to the company within the next few weeks, and if it is accepted within a reasonable time, either as made or varied by negotiation, the deal would have to be referred to the House as quickly as possible. Approval of the Legislature would be needed because of the financial arrangements involved. The voting of capital money to carry through the deal could be deferred until the regular session but the government in the meantime would need to know it was authorised to go ahead.

Delhi Expansion

Now that additional generating plant of 10,000 kW capacity has been installed, the Delhi State Electricity Board is endeavouring to clear up some of the back log of applications for connections. At the meeting of the Board earlier this month nearly 3,000 connections for domestic purposes were sanctioned, totalling some 750 kW.

Lift the Conduit Import Ban

The ban on the import of steel conduit during the period July-December, 1952, imposed by the Government of India, is creating shortages, with a consequent rise in prices, and the Electrical Contractors Association of India has protested to the Ministry of Commerce and Industry asking for the lifting of the ban. The Association points out that the indigenous industry is unable to manufacture steel conduit to a standard on a par with its foreign counterpart, and while the imported commodity is made to British Standard specification, the local product does not so conform. It is stated that the Indian manufacturers' product is made from any material available, is gas welded, and not free from internal roughness. As electrical contractors have had considerable difficulties in the past three years regarding suitable conduit for government work and for factories where certain regulations must be satisfied, it is suggested that the authorities will have to revise their specifications to allow the use of inferior quality material unless the ban is lifted.

Lamp Enquiry

On the results of a preliminary enquiry the Pakistan Tariff Commission has now decided to hold a full enquiry into the indigenous incandescent lamp industry at an early date.

New Schemes

The proposed hydro-electric stations at the Huka Falls and Aratiatia Rapids could generate 100,000 kW for the New Zealand State Hydro-Electric Department, the Minister in charge of the department, the Hon. W. S. Goosman, stated at the conference of the New Zealand Electrical Supplies Association, at Rotorua recently. "We must be realistic and look this in the face," he said, "and remember that we must have electric power." Mr. Goosman explained that the work being carried out at Huka Falls and Aratiatia Rapids was purely investigatory, and would interfere as little as possible with the natural beauty of the river.

Jap Development

In accordance with the Power Development Law, recently enacted, the Electric Power Sources Development Co. has now been formed in Japan. Its stated object is to develop within the next ten years new power resources totalling some 2,729 MW. This plan includes the vast Tadami River project which is expected to have an installed capacity of 703 MW. The business plan and financial matters of the new organisation have now been settled. The expenses for development of the 2,729 MW power resources and construction of the relative facilities of transmitting and transforming are estimated at some 269,500 million yen for ten years. The estimated expenditure is broken down to 117,600 million yen for the first five-year period from fiscal 1952 to 1956, and 151,900 million yen for the second five-year period from 1957. According to the decision of the Establishment Committee, the new company has a capital of 100,000 million yen, of which 99,500 million yen is provided by the Government, while the remaining 500 million yen are to be collected from the public. The company is to float debentures and seek loans from banks to raise the development and construction funds.

PERSONALITIES

IN THE INDUSTRY

Formerly district commercial engineer at Woking to the South Eastern Electricity Board, **Mr. D. B. R. Roberts** has now taken up duties as district manager at Ashford, Kent, to the Board. Educated at Gillingham Grammar School and Northampton Polytechnic, London, he served in the power department of the London electric section of London's Underground till 1928 when he joined the St. James and Pall Mall Electric Light Co., as a junior engineer. But the following year he rejoined the Underground group, going to Sutton as a mains assistant with the former South Metropolitan Electric Tramways and Lighting Co. By 1932 he was a mains engineer in charge of the Sutton and Mid-Surrey sections of the Sutton undertaking which had been taken over by the London and Home Counties J.E.A. In 1937 he became testing and protective engineer and a year later district substation superintendent for Sutton. On nationalisation he joined the Surrey sub-area headquarters as assistant engineer, planning and development, a post he held till going to the commercial side last year.

Mr. D. B. R. Roberts

On Thursday last **Mr. Paul Evans,** assistant divisional export manager for Scandinavia to Hoover Ltd., flew from London to Oslo. From there he goes by train to Trondheim and by road to Northern Norway beyond the Arctic Circle. During his six weeks business tour he will be helped by **Mrs. Inge Faulkner,** a Hoover washing adviser, who speaks Danish, Norwegian and Swedish.

Mr. A. J. D. Langford, M.A. (cantab), solicitor and deputy secretary of the East Midlands Electricity Board, has resigned and is going into private practice at Luton, we hear. **Mr. L. V. Ellison,** who has been assistant solicitor for the past three years, has now been appointed solicitor to the board.

Four more demonstrators and two more teachers have been awarded the E.A.W. Diploma in Electrical Housecraft. The demonstrators are **Miss Mary Cobbold** of Cambridge; **Miss Catherine S. Dees** of Sunderland; **Mrs. Jose G. Hamlett** of Urmston; and **Miss Mary J. Murray** of Fulham. Miss Dees gained distinction in cookery and laundry demonstration, and Miss Cobbold in salesmanship and laundry demonstration. The teachers are **Miss Irene Taylor** of Worksop and **Miss D. P. Muir** of Slyne, near Lancaster, who each gained a 1st Class pass.

At the recent annual meeting of the National Union of Manufacturers, **Mr. C. S. Garland,** A.R.C.S., B.SC., F.R.I.C., M.I.Chem.E., chairman of Stream-Line Filters Ltd., resigned the office of honorary treasurer after 27 years service. He was re-elected a vice-president.

Professor F. C. Thompson, Professor of Metallurgy in the University of Manchester, has been elected president of the Institute of Metals for the 1953-54 session. **Major C. J. P. Ball,** chairman and managing director of Magnesium Elektron, and **Professor G. V. Raynor,** Professor of Metal Physics, University of Birmingham, have been elected vice-presidents of the Institute.

The newly elected president of the Canadian Electrical Manufacturers Association is **Brig. F. C. Wallace,** president of Canadian Pittsburg Industries, Ltd.

Although he has retired from active participation in the Electrical Industry, **Mr. Harry Moss,** M.I.E.E., F.I.E.S., of Bradford, who is well known in contracting circles, maintains a keen interest in matters affecting the trade. Frequently he has uttered warnings against the danger of the inexperienced handyman who dabbles with wiring, and in the *Bradford Telegraph and Argus* last week he suggested the introduction of a home-safety campaign. Among his other activities, Mr. Moss is this session's chairman of the Bradford group of the Illuminating Engineering Society, and is on the council of the West Riding Federation of Engineering Societies. Last week he lectured to the Bradford Moor Veterans Association on "The Pageant of the Lamp," tracing the history of electric lighting from the pioneering days of Mr. Swan and Mr. Edison until the present day. At 73 years of age, Mr. Moss is obviously still very energetic.

W. T. Henley's Telegraph Works Co., Ltd., have appointed **Mr. J. Nicholson** as branch manager of the company's Leeds branch in succession to the late Mr. L. Brooke. Mr. Nicholson joined the company's Sheffield branch in 1926, was transferred to the Leeds branch in 1931, and appointed an outside representative in 1939. He is a member of the Association of Mining Electrical and Mechanical Engineers, and is on the Council of the Association's North West Yorkshire branch.

Mr. J. Nicholson

Mr. H. Hubbard has been appointed a director of Oakley Brothers, Ltd. This company, which is a subsidiary of W. T. Henley's Telegraph Works Co., Ltd., has a modern foundry at Cradley, Cradley Heath, Staffs., for the production of grey iron castings. Mr. Hubbard is manager of the engineering sales department of the holding company.

Mr. H. Hubbard

Mr. Bonner W. A. Dickson, who recently relinquished his seat on the board of Vickers-Armstrongs, Ltd., has become a director of Oliver Pell Control, Ltd. (incorporating the Varley Magnet Co.).

Mr. J. R. Corrin, M.I.C., has been re-appointed by the Lieut.-Governor as chairman of the Isle of Man Electricity Board and has re-nominated **Mr. J. D. Qualtrough,** C.B.E., S.H.K., **Mr. S. Clucas, Mr. W. O. Quayle** and **Mr. J. W. Callow** as members of the Board for a further term of five years.

Mr. A. M. F. Palmer, A.M.I.E.E., technical editor and director of studies to the Electrical Power Engineers' Association, has been returned as Member of Parliament for the Cleveland division of Yorkshire, in the by-election held last Thursday, in which he defeated Mr. P. H. B. Wall (Conservative) by 25,985 votes to 22,064. Mr. Palmer stood as Labour Co-op candidate. He thus returns to the House after an absence of about two years, having previously been M.P. for Wimbledon, Merton and Morden from 1945 to 1950.

Mr. N. B. Croft, of 12/14 Great George's Street, Belfast, has been appointed agent for Northern Ireland by Dimplex Ltd.

Mr. J. P. Coleman, M.I.E.E., has been elected chairman of the London Region of the Engineering Industries Association. That section of the E.I.A. is constantly growing and now has 1,200 member firms. Mr. Coleman is managing director of Gresham Transformers, Ltd., a company which has expanded rapidly from a modest beginning but which now numbers many Government departments, Electricity Area Boards, the National Coal Board, and important industrial undertakings amongst its clients. Its output has trebled in the last four years, and its capacity for the production of standard and special transformers is still being increased. Plans for further extensions are in hand, we learn.

Mr. J. P. Coleman

Mr. A. E. Aird, works superintendent of No. 1 sub-area of the Merseyside and North Wales Electricity Board, who has just retired, was last week presented with a Royal Worcester dinner service by Mr. P. Bregazzi, sub-area manager, on behalf of his colleagues.

Arrow Electric Switches Ltd. have appointed **Mr. E. H. Foster,** A.M.I.E.E., as sales engineer in their Motor Control Gear Division. Mr. Foster, who served his engineering apprenticeship with A. Reyrolle and Co. Ltd., was previously with Powell Duffryn Carbon Products Ltd., Hayes.

Mr. L. J. Brown has been appointed managing director of Electric and Musical Industries Ltd. He is already on the boards of several of the company's subsidiaries.

Ekco-Ensign Electric Ltd. announce the appointment of **Mr. F. A. Thiel** as their Northern sales manager with headquarters in Manchester and Preston. Mr. Thiel has been on the sales staff of the company since 1939 and has a wide and successful experience of the lighting industry. The company also announce that **Mr. J. R. Wilson** has been appointed as their representative covering the counties of Devon, Cornwall and certain areas of West Somerset.

Mr. F. A. Thiel

Mr. W. Campbell Allan, a director of Richardsons Westgarth and Co. Ltd. and secretary of the firm until his retirement in 1948, has been elected honorary treasurer of the North-East Coast Institution of Engineers and Shipbuilders.

Mr. R. S. Crump, M.I.Mech.E., technical director and chief engineer of Henry Meadows Ltd., has retired as chief engineer but continues his long association with the company as technical consultant. **Mr. J. E. Robinson,** formerly chief technical supervisor of Petters Ltd., has joined Henry Meadows Ltd. as chief engineer, and **Mr. G. Wedge,** sales manager, takes over the position of technical adviser. In addition, **Mr. E. B. Christie** is appointed contracts manager and **Mr. A. F. Brown,** who recently joined the firm, is now sales promotion manager.

OBITUARY

Mr. B. E. Stott, A.M.C.T., A.M.I.E.E., M.I.B.F., formerly managing director of Ferrous Castings Ltd., died on October 20, aged 66. He joined that company in 1933 as general manager, after 20 years service with the Harland Engineering Co., initially as head office manager, and between 1928 and 1933 as contracts manager at Alloa. His earlier experience had been gained with Henry Simon Ltd., and Simon Carves Ltd.

Mr. D. G. Cameron, who for many years handled the sales of Bylock Electric Ltd. in the London area, died on October 20, aged 53.

Mr. E. Fulford, A.M.I.E.E., who died on October 21, aged 78, retired in December, 1937 from the position of district electrical engineer, at King's Cross, to the L.N.E.R., which he had held for two years, after ten years as electrical assistant to the previous holder of that post. His life-time had been spent in railway service, starting with the Great Northern Railway in 1901 as a draughtsman at Holloway power house, in the electrical department.

Mr. Noel Garrod-Thomas, controller of sulphuric acid throughout the last war, and general manager of the National Sulphuric Acid Association from its formation just after the first world war until his retirement last June, died on October 24, aged 67.

Mr. P. Croaker, formerly manager of the Paper Cable Sales Dept. of Pirelli-General Cable Works Ltd., died on October 6, aged 74. He started with W. T. Henley's Telegraph Works Co. Ltd. in 1902, but transferred in 1910 to Marconi's Wireless Telegraph Co. Ltd., being responsible for the erection of masts and commissioning of stations both in this country and abroad. He was engaged for a number of years on this work in Spain, on Ascension Island and in British Guiana. He joined Pirelli-General Cable Works Ltd. in 1922 and from 1928 had been the manager of the Paper Cable Sales Department.

Mr. J. J. Honan, A.M.I.E.E., B.L., late assistant examiner at H.M. Patent Office, died on October 27, aged 69.

Wills.—Mr. E. Ellwood, of the Manor Electric Co., left £10,789 gross (£9,762 net value). He left the goodwill, etc., of his business to his sceretary, Ruby A. Bellamy, "in appreciation of the way she has by her efforts and interest so ably assisted me in the building up of my business."

Mr. E. L. Potter, chief chemist of the Micanite and Insulators Co., Ltd., left £12,024 gross (£11,679 net value).

Mr. William Shearer, chairman and managing director of Power Securities Corporation, Ltd., chairman of Balfour, Beatty and Co., etc., left £228,861 gross (£169,201 net value).

NEW LITERATURE

Electrical Equipment of Buildings

Editor E. Molloy

ANY comprehensive set of technical books such as the *Practical Electrical Engineering Series* now being published by George Newnes must have one or two volumes for the "oddments" of the subjects. The present volume is of this type. Within its covers 15 authors deal with matters as diverse as lightning conductor protection and the installation of electric motors. In these circumstances an unfortunate variation in approach is difficult to avoid, and it occurs here. Some chapters are useful check-lists of points to watch; others are more lengthy discussions, though not necessarily more helpful for that. Briefly there are chapters on installations for houses, hospitals, schools, theatres and cinemas; on fluorescent and discharge lighting, lightning conductors, time switches, and wind-power generating plant; and on installing electric motors, industrial switchgear and batteries. Published by George Newnes, 260 pages, 8¼ in. by 5½ in. Price 17s. 6d.

Rewinding and Repair of Electric Motors

by K. Wilkinson

READERS of the the ELECTRICAL TIMES have had ample evidence in recent weeks of Mr. Wilkinson's ability to deal with the practical details of his craft. In this present volume he has concentrated, in his own words, in producing a workshop handbook for the small shop. In a field where the scarcity of information is notorious, this venture should be welcomed by a wide range of readers. It has the inestimable advantage of beginning at the beginning and going right the way through to the end: in other words, from inspection and the recording of data when the job is received to testing and the final varnishing and assembly. In between there are chapters on the general preparation necessary for winding, on former making, and on coil-, stator- and armature-winding. In all cases a method of proceeding is suggested, but more than this, the reasons for its adoption are discussed and difficulties likely to be encountered are analysed. It is this last feature, which is repeated throughout the book, that gives this work the hallmark of reliability, and justifies its hearty recommendation to all who seek for advice on this subject. Published by E. & F. N. Spon, 212 pages, 8¼ in. by 5½ in. Price 20s.

BOOKS RECEIVED

The Resonant Cavity Magnetron, by R. S. H. Boulding. Relatively simple introduction for engineers using equipment incorporating magnetrons. Published by Newnes, 147 pages, 8¼ in. by 5½ in. Price 21s.

Examples in Electrical Calculations. Written for Naval students of electrical technology. Covers O.N.C. and similar requirements. Published by H.M.S.O., 507 pages, 8¼ in. by 5½ in. Price 17s. 6d.

Cost Accounting and Productivity. The report of the Technical Association Mission, No. 50, organised by the Organisation for European Economic Co-operation. Discussing the use and practice of cost accounting in the U.S.A., it makes recommendations for the adoption of current American practices. Published by the O.E.E.C., and may be obtained through H.M.S.O., 130 pages. Price 4s. 6d.

ONTARIO'S ADVANCE

Large Increase in Generating Capacity

AN increase of about 62,000 in the total number of consumers served by the Hydro-Electric Power Commission of Ontario either directly or through the municipalities supplied, is recorded in the abridged report of the Commission for 1951 just received. The total at the end of December last was 1,249,366 consumers. At that time the Commission was supplying power to 1,178 municipalities, of which 315 were on a cost-contract basis, and the peak load of these averaged 1,524,106 kW during the year. In addition, the Commission served 203 industrial consumers direct, whose monthly average peak load amounted to 939,263 kW, an increase of 93,114 kW over the corresponding figure for the previous year.

Power Sales

The domestic consumers in 355 municipalities in the province consumed during 1951 an average of 3,960 units which is an increase of over 60% on the 1945 figure. Altogether, the demand from all consumers increased by 11·1% during the year, but the greatest rises were recorded in the industrial field. Consumption in the base metals industry, for instance was 23% higher than in the previous year, and in silver and cobalt mining 41% up.

The year under review saw the thirtieth anniversary of the Rural Hydro-Electric Distribution Act, and marked a record expansion in that sphere, some 25,795 rural consumers being connected—a 9% increase.

In the work of frequency standardisation too, a considerable amount of work was undertaken, and by the end of 1951, some 178,400 of the estimated 886,000 consumers ultimately to be affected by the scheme were changed over to the 60 cycles system. This involved the changing over of 449,130 appliances during 1951.

Power Development

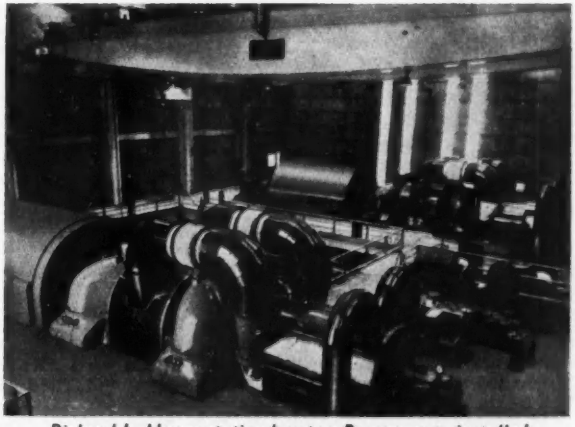
But it was in the power supply side that a most notable advance was made by the Commission, for the year saw the official opening of two steam power stations, the completion of two plants which reached the initial operating stages in 1950, and later phases of construction of the Otto Holden development. Work has since begun also on the Sir Adam Beck-Niagara No. 2 generating station which is to have an ultimate installed capacity of 900 MW.

The two steam power stations, the Richard L. Hearn at Toronto, and the J. Clark Keith at Windsor, house much British made plant. At the former, the first 100 MW Parsons turbo-alternator was put into operation a year ago and three other sets, making in all 400 MW are scheduled for installation by next February. The J. Clark Keith station now has two English Electric sets, and here also two more are being added by next year to bring the installed capacity to 264 MW.

On the hydro side, the Commission's second largest water power scheme, Des Joachims, was completed during the year, with a total capacity of 380 MW made up of eight sets. The last of eight 15 MW sets was also placed in service at the Chenaux hydro-electric station on the Ottawa River, about 60 miles downstream from Des Joachims.

To transmit this power to the Southern Ontario area, a further 294 miles of 230 kV transmission line was completed. The Commission also added to its 115 kV network.

Turning to financial matters, the report records that operations of the Southern Ontario and Thunder Bay Systems resulted in a surplus of $6,695, while in Northern Ontario expenses exceeded revenue by $536,223.



Richard L. Hearn station has two Parsons sets installed

The BUYER'S *Column*

The Hillman F.H.6 Motor

THE new F.H.6 motor introduced by HILLMAN ELECTRIC MOTORS, LTD., 2-3 Northwold Rd., London N.16, incorporates several new features, the stator pack being die-cast with a body casting, whilst the rotor is pressure die-cast in aluminium by the centrifuge method.

Identical outputs can be obtained for a.c. or d.c. motors, the Universal type being fitted with adjustable brush gear, to give maximum output with improved commutation.

The end frame embodies the firm's standard feature in that the bearing housing is interchangeable for either ball bearing or plain bearing.

For single phase, the starting torque is controlled by a positive action centrifugal switch, whilst for high starting torques a capacitor is available.

These can be supplied for either totally enclosed or fan protected ventilation, by means of interchangeable inspection covers.

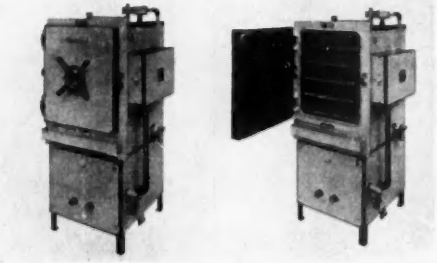
A suitable gear-box unit can be fitted for slow-speed driving units.

More Creda Equipment

THE new Creda HC5290 steaming oven introduced by SIMPLEX ELECTRIC CO., LTD., Broadwell, Oldbury, Birmingham, is designed for long life with low maintenance and is fully automatic.

It is equally suitable for steaming puddings, potatoes, meat, fish, etc., and when cooking is finished may be used for sterilising pots and pans.

The oven operates at a slight pressure, the release valve in the top of the oven being fitted with a plunger set to operate at a pressure of 8 oz. The Creda pressure switch operates between 4 and 6 oz. thus ensuring the correct oven temperature with the maximum of economy.



Creda's HC5290 steaming oven has a worthwhile capacity

The heater well is fed by an integral cistern fitted with a low pressure ball valve. The well is heated by three automatic immersion heaters, the centre being fitted with an automatic cut-out which cuts off the electric supply should the water drop to an unsafe level.

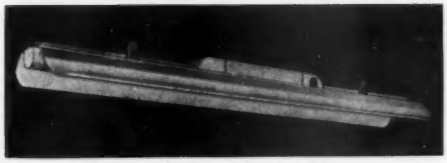
The oven exterior is finished overall in durable silver grey vitreous enamel. Total loading is 9kW and the unit may be wired for either single or three-phase 4-wire supplies.

New Crompton Fittings

LATEST additions to the range of fluorescent fittings available from CROMPTON PARKINSON, LTD., Crompton House, Aldwych, W.C.2, are:—

Type AK1111—Closed top 5 ft, 80 W, one-lamp reflector. Type AM1111—Similar but slotted top.

These fittings are designed for light industrial purposes where continuous line mounting is not likely to be required. Considerable ingenuity has been exercised to effect such desirable features as adjustable wiring centres suitable for conduit or chain suspension; hinged lampholder covers; composite high-power factor control gear incorporated in fitting construction; easy accessibility of starter and lamp for maintenance purposes and particularly simple wiring arrangements for initial installation.



Crompton's latest AK1111 fitting

The reflector, of the open-ended pattern, is finished in high-quality white enamel on fully "Bonderised" and chromate pretreated metal. List price is 170s., complete with all control gear but exclusive of lamp. It is available in the 200/250 V range.

Reduction in prices of many of the firm's fittings are also announced. These are tabulated as follows:—

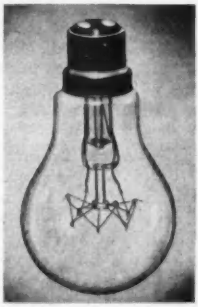
				Reduced to		
	£	*s.*	*d.*	£	*s.*	*d.*
5 ft one-lamp closed end stove-enamelled reflector (slotted or closed top) ...	9	8	0	8	17	4
5 ft one-lamp closed end vitreous enamelled reflector	12	4	4	10	13	4
5 ft one-lamp "Perspex" reflector	13	8	4	12	5	0
5 ft one-lamp batten fitting ...	7	0	8	6	5	0
5 ft one-lamp "Seagull" fitting	8	16	0	7	19	0

Recent Atlas Developments

THORN ELECTRICAL INDUSTRIES LTD., 105 Judd St., W.C.1, have recently announced the release of a new rough-service lamp designed to give greater strength and longer life in service. Both the 40 W and 60 W lamps are enclosed in

60 mm diameter bulbs and the filament, of thoriated tungsten, is mounted in a staggered single wreath instead of double wreath as formerly. The filament supports have closed loop ends and no amount of vibration will dislodge the filament from its suspension. Prices remain as previously, namely 2s. for the 40 and 60 W and 2s. 9d. for the 100 W (200-260 V range) plus purchase tax.

Another Atlas innovation for Coronation year is a 5 ft 80 W fluorescent tube in which phosphors have been used to form three separate bands, pink, white and blue, of colour fluorescent light. The price of this tube is 17s. 6d. (plus 4s. purchase tax). It is, of course, suitable for use with any normal 80 W control gear.



The Atlas rough-service lamp

A new domestic fitting range, the HB/0031 and the HB/0041, presents the industrial batten unit in a guise more suitable to the home surroundings at a moderate price. Incorporating one 3 ft 30 W or one 4 ft 40 W tube, they are adequate for the normal lighting of kitchens, bathrooms and landings. The 3-ft model, HB/0031, retails at £4 5s. (plus 7s. 8d. purchase tax) and the 4-ft model at £4 16s. 4d. (plus 10s. 7d. purchase tax).

Improved Filaments for Projector Lamps

IN this country the filament coils in projector lamps have hitherto been equally spaced. A more satisfactory arrangement has now been adopted in the Osram 750 W biplane filament A1 projector lamps, which are made by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2: the two outside filament coils of each plane are placed closer together than the two inside coils. The object of the differential spacing is to ensure that the temperature over the whole surface of the filament is as uniform as possible, and that the resulting illumination is also evenly spread over the complete area of the screen.

A Quick-boiling Kettle

ILLUSTRATED below is a four-pint quick-boiling kettle in polished aluminium which is available from ENGINEERING AND EXPORT CO., LTD., 2 Regent Street, Birmingham 1.

E.E.'s 4 pt. quick boiler kettle

This "EE" brand kettle is fitted with a 1,500 W Bray "Tubalox" automatic safety element for 200/210, 220, 230/40 or 250V supplies and is guaranteed for twelve months.

TRADE PUBLICATIONS

ACCESSORIES.—A new electrical accessories catalogue including a price list giving details of consolidated prices which came into effect on Oct. 20, has now been published by Edison Swan Electrical Co. Ltd., 155 Charing Cross Road, London, W.C.2.

MOTORS AND EQUIPMENT.—"Versatility" is the title of a leaflet which has been issued by Lancashire Dynamo and Crypto Ltd., 94 Petty France, London, S.W.1. It shows pictorially a few of the diverse applications of the company's products in industry.

INSTALLATION SUPPLIES.—Welcome indeed is the publication of a new edition of the "Sunco" Catalogue of installation supplies. This volume is invaluable to contractors and installation engineers. The catalogue has been completely revised and brought up to date to include two new sections on Pyrotenax Cables and Electricians' Tools, and does form a worthy successor to the edition published in 1936.

INFRA-RED HEATERS.—For use in rearing poultry the Visi-check Brooder Co., Ltd., Bradford Mill, Philips Lane, Colne, Lancs, have introduced a new range of infra-red heating units. These are illustrated and described in a folder which the firm has just issued.

SWITCHGEAR.—Now available is a consolidated price list of the range of switch plugs, plugs and sockets manufactured by Bill Switchgear Ltd., Aston Lane, Perry Barr, Birmingham 20.

CUTTING MACHINES.—Three new leaflets by A. and S. Osmond, Ltd., 254/6 Hotwell Road, Bristol 8, feature high-speed abrasive wheel cut-off machines and tile cutting machines.

CONDUIT AND DUCTING.—In a new brochure recently issued by them, the Ductube Co., Ltd., Regent House, Regent St., London W.1 have summarised the whole of their experience over the past two years. It shows methods of fabricating various ducts and the correct way to use Ductube in these different applications.

DRYING PLANT.—A brochure No. 4706 just issued by the Sturtevant Engineering Co. Ltd., Southern House, Cannon St., London E.C.4, deals with the air drying plant supplied by the firm. It replaces No. 4701 which is now out of print.

ACCESSORIES.—The recently introduced 13 amp plugs and sockets by Midland Electric Manufacturing Co. Ltd., Reddings Lane, Birmingham 11, which were noted in these columns in our issue of Oct. 23rd, are featured in an illustrated folder available from the company.

The WEEK in NEWS

ELECTRICIANS' WAGE CLAIM REJECTED

THE claim for an immediate increase in wages for electricians, put forward by the Electrical Trades Union, has been rejected by the National Federated Electrical Association. The Council of that Association has confirmed its previous opinion that no case had been made out for an increase in wages in the electrical contracting industry on the grounds put forward by the E.T.U., and has again declared that wages in that industry could not be disassociated from other matters under investigation by the N.J.I.C.

Details of Census of Production

BoT Order explains Simpler Censuses in 1953 & 1954

PRELIMINARY details of the Census of Production, which is to be taken next year for 1952, were given as long ago as last January, but the Board of Trade has just issued an Order giving effect to the arrangement and indicating its scope. As previously announced sampling methods will be used for the first time, and these will be facilitated by the fact that details of output and the usage of certain materials were obtained in the census for 1951. The adoption of these methods will relieve a large proportion of the smaller and medium-sized concerns of the need to make a return. In addition, fewer questions will be asked.

Undertakings producing electricity, coal, gas and similar fuels will be exempt from making returns to the extent to which they supply the necessary information to the Minister of Fuel and Power.

The census to be taken in 1954 is also to be on the same simplified basis. Both censuses will cover all producing industries and returns will be required from all firms over a certain size in each trade. Questions will be asked on working proprietors, employment, wages, plant and machinery, building work, total materials and fuel purchased, work done, stock, total output and transport payments. Further details of the statutory form for the census to be taken in 1954 will be despatched to trade associations as early next year as possible.

Any inquiries should be addressed to the Census of Production Office, Neville House, Page St., S.W.1.

Ridley Committee Report Debated

ON Tuesday, the House of Commons debated fuel problems with particular attention to the Ridley Committee's Report. Opening the debate the Minister of Fuel and Power said the Government wished to have the views of the House before coming to any conclusion on the Committee's recommendations. He did, however, emphasise that the often quoted "Plan for Coal," of 240 million tons per year in 1961, was a value of what could be sold, rather than what could be produced. In fact, it was now hoped to produce enough to satisfy the demand of 260 million tons per year, estimated by the Ridley Committee.

So far as co-operation between nationalised industries was concerned and matters of tariff fixing, he felt personally that the best procedure was to rely on meetings between chairmen of nationalised boards and the Minister, rather than have specialised committees.

He hoped to replace the Ministry's Industrial Fuel Testing Service by an independent organisation as recommended by the Committee. Discussing coal supply in general, he announced a decision to free the sale of untreated small coal below $\frac{3}{4}$ in. to domestic consumers. He claimed that this was suitable for burning on improved solid fuel grates.

The First Half-Century

An improvement that will be of much help to tramway managers in their efforts to deal with the overcrowding of cars at times of dense traffic is the canopy-top. This protection for outside passengers is the design of Liverpool Corporation Tramways' general manager (Mr. C. R. Bellamy). It was his intention originally to cover the entire upper deck with the canopy, but it was found that a draught was caused by the stairways, and to avoid this the covering was set back clear of the staircase. This change had also the advantage of reducing the top-heavy appearance which would have been so noticeable had the entire car been covered. Only one-third of the total roof-covering is permanent, and this consists of a wooden centre, which it was necessary to employ in order to give sufficient stability to the trolley pole base. One of the incidental advantages of the canopy-top is that it renders unnecessary the cumbersome trolley standard on the upper deck, and thus secures space for additional seats.—*From our issue of October* 30, 1902.

Zinc Trading to be freed Next Year

IT was announced by the Minister of Materials last week that free trading in zinc on the London Metal Exchange would probably be resumed on January 1. Discussions with the trade and other interested organisations would take place immediately. From the date of reversion, the private import and sale of virgin zinc would be allowed, the Metal Exchange would be open for transactions, and the Ministry would cease to trade.

Present and prospective supplies of zinc were ample, said the Minister, and as regards prices, there was no reason to suppose that zinc would be any different from lead, which, since released from control, had fallen considerably in price. Existing Government stocks had been estimated at about 150,000 tons and in the next few months that figure should be raised to 200,000 tons.

It will be recalled that free dealings in lead were re-opened on October 1 last, and tin was freed about 3 years ago. The prospects as regards copper are believed to be quite bright. Subject to an early settlement of the strike in the N. Rhodesian copper belt, trade circles envisage a possible resumption of private trading in copper by next summer.

Applications for Import Licences Invited by B.o.T.

THE Board of Trade is now inviting importers to apply for licences to import during the first half of next year, those items which were subject to the November, 1951, and March, 1952 cuts. Quota headings under which licences will be issued have been announced, but the value of quotas will be made known at a later date.

Allocation of licences will take into account imports during previous periods, but in most cases an option will be given on one of two past trading periods. Applications should be made to the B.o.T. at Romney House, Tufton St., S.W.1, by November 12.

Few commodities of electrical interest were affected by the restrictions imposed last November. Numerous electrical goods were included in the restrictions imposed following the Budget of last March, however. Notable among those items were lamps and lighting fittings; domestic fitments and appliances, including vacuum cleaners, fans, irons and toasters; washing machines and refrigerators (not exceeding 12 cu. ft.).

2nd FACTORY SAFETY EXHIBITION IN 1953

FOLLOWING the success of the Safety and Factory Efficiency Exhibition staged in Birmingham during Festival Year, the organisers, Birmingham Industrial Safety Group, have decided to hold a similar exhibition during Coronation Year. This was announced last week and the dates have been fixed for June 19 to 26 next. It will take place in the Bingley Hall and will follow the same pattern as its predecessor, although the scope is being extended to cover all aspects of safety, efficiency and health in industry. A conference emphasising training for safety and health is also being arranged. Last year's four-day show attracted over 10,000 visitors.

Strike in Rhodesian Copper Mines

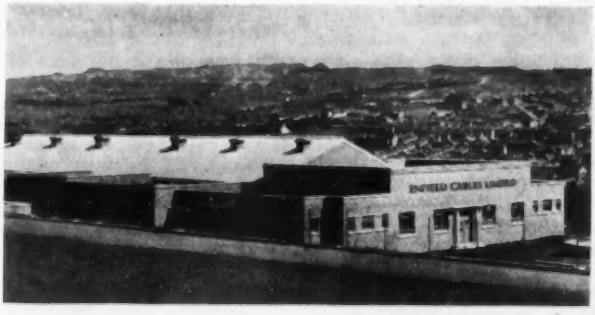
AFRICAN workers in the N. Rhodesian copper mines went on strike last week and production at all the mines concerned —Nchanga, Nkana, Mufulira and Roan Antelope—has ceased. At least 37,000 Africans of the total labour force of about 39,000 are estimated to have stopped work. Basis of the dispute appears to be the Union's claim for a wage increase of 2s. 8d. a shift.

Allocations of Iron and Steel Relaxed

AS from January 1 next, no distinction is to be made in allocation between alloy iron and steel, and non-alloy steel, the Ministry of Supply has announced. Consumers will be able to choose how much of either material they wish to acquire, within their total authorised tonnages of course.

Productivity Report on Zinc and Aluminium

THE report of the Zinc and Aluminium Die Casting Productivity Team which visited the U.S. last year under the auspices of the Anglo-American Council on Productivity was published on Monday. In the course of its six-weeks tour of the States, the team visited 18 plants.



Increased output of a wide range of covered wires by Enfield Cables' has been due largely to the transfer of much of their productive capacity to their new factory at Blaenavon, Monmouthshire. Pictured above is the Welsh factory, extending over 15,000 sq. ft., and situated in a most picturesque spot. Incidentally, the move from Brimsdown, Middlesex, including machinery, was carried out within a fortnight

Cost of Electricity in the North-East

FOLLOWING the publication of the annual reports and statements of accounts of the B.E.A. and Area Boards, there have been a number of warnings given of possible increases in electricity tariffs. The latest warning has been given by the chairman of the N. Eastern Consultative Council, Mr. W. S. Hall, while commenting on the Board's deficit of £126,000 in the past financial year.

The cost of producing and distributing electricity had increased and less power was being consumed now than in previous years. Consequently revenues were going to be smaller and domestic consumers may be asked to pay more for their supplies. One member pointed out, however, that if tariffs were raised again, there might easily be a greater drop in consumption. This warning in the N.E. follows similar forecasts made in the Midlands and South West (reported last week) and in the E. Midlands (reported in our October 9 issue).

At the same meeting of the Consultative Council it was announced that charges for electricity to trolley bus and tramways were to be standardised. The new rates would operate from October 1 last. At South Shields the present revenue amounted to £25,030 but the same amount of electricity would cost £23,599 at the new rate. At Sunderland, on the other hand, existing payment of £28,735 would rise to £29,098.

Electrical Progress in Eire Exhibited

AN overall picture of electricity as it applies to everyday life was the object of the Electrical Exhibition staged at the Metropolitan Hall, Dublin, earlier this month. It was organised by the Society of Irish Electrical Traders. Emphasis at the exhibition was on domestic appliances, particularly those manufactured in Ireland, which included an electric frying-pan (introduced at the show) retailing at 89s. 6d. and a new thermostatic iron priced at 52s. 6d.

In the industrial sections were arc welding machines, motors and sundry displays of lighting, especially fluorescent lamps and fittings.

Opening the exhibition, the Minister of Finance gave a good idea of the development of the Irish electrical industry when he compared the 1939 value of home-manufactured apparatus, £319,000, with the 1950 figure of £2,117,000. Imported appliances in 1939 amounted to £861,000 with £375,000 worth of motors, generators and the like, while comparable 1951 figures were £5,120,000 and £1,590,000 respectively.

OFFICIAL PUBLICATIONS

FUEL RESEARCH, 1951. Report of D.S.I.R. H.M.S.O. 2s. 6d.

CENSUS OF PRODUCTION (1953) (Returns and Exempted Persons) ORDER (see page 798). H.M.S.O. 2*d*.

STATEMENT OF GUARANTEE given by Treasury on loans proposed to be raised by B.E.A. (see page 801). H.M.S.O. 2d.

E.R.A. Reports:—
J/T 151. *Creep Resistance of Wrought Carbon Steels*, by C. H. M. Jenkins and H. J. Tapsell, 21s.; O/T 7. *Bond-Strength of Galvanised-Steel Angle in Concrete*, by G. Mole, 12s.; *Effect of Inductance on Fine Transfer between Platinum Contacts*, by J. Warham, 12s.

CLOCKS AND WATCHES (Maximum Prices) (Revocation) ORDER. H.M.S.O. 2d.

RADIO AND TV SALES CONTINUE TO RISE

MANY retailers reported an improvement in sales of radio and TV sets during August, according to the latest index issued by the R.T.R.A. The increased business shown for the first time for some months during July continued, and August's TV figures were also greater than those in the corresponding month last year. Radio sales during the month under review rose by 0·33 to 5·63 sets per shop, as compared with 7·54 in 1951. Sales of television sets rose from 3·93 to 5·29 in August, and this compared with 4·54 sets in August last year.

Five-day Course on Working Conditions

A FIVE-DAY residential course on "Welfare Services and Working Conditions," is being arranged by the Institute of Personnel Management. It will take place at the Coburg Court Hotel, Bayswater Road, London W.1, between November 30 and December 6. The course is designed to be a serious contribution to an organisation's training plan for its personnel staff. It is intended for those who already have some knowledge of the subject, and will be of little value as initial training. Accommodation can be booked for the duration of the course on application to the Institute.

NEW TECHNOLOGY AWARD FOR HIGHER STUDIES

WELL known in the field of technical education, the certificates of the City and Guilds of London Institute are to be extended to include an Insignia Award. This is being established to give encouragement and recognition at a higher level than the C. and G. Full Technological Certificate, for engineers who continue to pursue their studies.

Established under the Institute's Royal Charter, the Insignia Award is intended as a mark of distinction for those who have combined a sound practical training with an adequate knowledge of the fundamental scientific principles of their industry, and who possess a capacity for leadership and administration. It will carry with it the right to use the insignia letters, "C.G.I.A."

Full details of the award may be obtained from the Director, Department of Technology (I.A.), 31 Brechin Place, London, S.W.7. Candidates must be 30 years of age, normally hold a C. and G. full technological certificate, and have had seven years' suitable industrial experience. The preparation of a report or thesis is required.

Siemens warm-white fluorescent lamps installed in W. H. Smith's new bookshop at Southsea

Industrial Expansion in Northern Ireland

INDUSTRIALISATION of N. Ireland is proceeding at a remarkable pace. The latest firm to expand by taking premises in the country is the Plessey Co., Ltd., manufacturers of electrical and mechanical components. This company has decided to occupy the N.I. Government's advance factory at Ballynahinch in Co. Down, and are expected to employ some 140 persons at the outset. The Minister of Commerce, speaking in the N.I. House of Commons last week said that during the year ending last month, fourteen firms had agreed to extend production with the assistance of the Government.

In terms of employment, the total number expected from those undertakings was 3,400. In 1951, additional employment provided by industries which started production with Government assistance, since 1935, was 24,000. The Minister added that the total cost of all factories and extensions would be about £2½ million.

UNESCO Studies Rural Electrification

THIS week a study group consisting of specialists from a number of European countries, from Latin America, and from the Far East, began work in Geneva to exchange views on rural electrification. Their discussions are expected to last for about three weeks. A more comprehensive study of experience in the field is being prepared by a four-man panel of experts, amongst whom is Mr. C. A. Brown, agricultural electrification adviser to the B.E.A. This panel has before it reports prepared by fourteen countries.

Funds for this study have been made available by the Technical Assistance Administration of the United Nations and the Food and Agriculture Organisation. Director of the study is M. Pierre Sevette, head of the Electric Power Section of the Economic Commission of Europe.

B.E.A. Borrowings

A STATEMENT of guarantee has been given by the Treasury replacing that given on June 16. The guarantee was actually given on Sept. 2, but has just been officially issued through H.M.S.O. The guarantee amounts to a sum not exceeding £55 million and is in respect of temporary borrowings by the B.E.A. from the Clearing Banks and Scottish Banks or other persons up to Oct. 31.

Fluorescent Lamps Enhance Southsea's New Bookstall

MANY of the bookstalls belonging to W. H. Smith and Son, Ltd., both in London and elsewhere, have been modernised and rebuilt since the war. At Southsea a new shop has just been completed on a recently acquired site. The modern layout and counters are, perhaps, a departure from the familiar appearance of the company's shops. A pleasant atmosphere has been created, enhanced by up-to-date fluorescent lighting fittings and lamps supplied by Siemens Electric Lamps and Supplies Ltd.

General illumination is provided by Sieray (FTF 5281) pendant fittings with reeded Perspex diffusers housing 5 ft 80 W lamps. The library on the first floor has been lit similarly but with close ceiling fitments. A feature of the installation is the built-in lighting, again employing fluorescent tubes, which has been used in the showcases. This installation was carried out by W. P. Robertson.

Y.E.B. refunds £30,000 to City Transport Dept.

AGREEMENT has now been reached between Bradford Corporation and the Yorkshire Electricity Board over rebates on power supplies for the city's transport system during the year 1950-51. Negotiations on the rebate have been going on now for some months. Bradford's town clerk reported last week that the Board had agreed to refund over £30,000 for the year in question. The amount had been based, he said, on the difference between the reduced amount of electricity used when the city's last tram service was discontinued, and the minimum charge which previously existed.

It was pointed out that the Electricity Board did not admit liability for the refund but wanted to effect a settlement fair to both parties. The city's transport committee is well satisfied with the arrangement.

Judging this Week in S.W. Display Contest

AS reported last week, the annual display competition among service centres in the S.W. Electricity Board's area is well under way. Four showrooms from each of the four sub-areas have been selected from a total of 94 entries to take part in the final round of the contest. Judging in the final round is taking place this week and results should be known shortly.

The two previous competitions have both been won by teams from the Devon sub-area —Bude in 1951 and Dartmouth in 1952. We note that the latter have qualified though Bude have not.

B.B.C's Ship-to-Shore TV Experiments

THE B.B.C. has recently been carrying out experiments with the co-operation of British Railways (S.R.), in order to ascertain the possibility of obtaining television pictures from a cross-channel steamer on the Dover-Boulogne run. Special signals were transmitted from one of the outside broadcast units aboard the motor-car ferry *Lord Warden* to a receiver at the R.A.F. radar station at Swingate, and were entirely successful.

Three new display cards produced by E. K. Cole, Ltd., for Ekcovision. Two summarise the advantages of the 132 sq. in. and 85 sq in screen sets, and the third, improvements brought about by "Spot-wobble"

Joint Meter-Reading on Merseyside ?

PRELIMINARY discussions are now taking place concerning the possibility of introducing a joint meter-reading scheme in the Merseyside and N. Wales Electricity Board's area. At a meeting of the area's Consultative Council last week, the chairman, Mr. H. Evans, announced that the B.E.A. had agreed to experiments being carried out, and following upon that agreement talks with the Gas Consultative Council were being held.

Despite the many arguments for and against the scheme, the announcement provoked little comment. It was pointed out by Mr. Evans that the idea was by no means new to the area. He said the old Liverpool Gas Co. had gone into the matter in great detail many years ago and had come to the conclusion that administrative difficulties outweighed any advantages.

It will be recalled that the formulation of plans for such a scheme is now being carried out in a number of districts throughout the country, notably in the North-East and London. The proposal has also aroused controversy, and not very long ago the N.W. Board's chief accountant wrote an article in the Board's publication *Area-topics*, stating that the scheme would increase costs.

An Order For Large Arc Furnace

WE hear that the Birmingham firm of Birlec Ltd. have been commissioned by Samuel Fox and Co. Ltd., in association with the United Steel Companies Ltd., to supply one of the largest arc melting furnaces to be either manufactured or installed in this country. This Lectromelt equipment will have a nominal capacity of 60 tons and will be rated at 15,000 kVA with on-load tap-change gear. The unit is to be installed at Samuel Fox's Stocksbridge works, where it will be used for the production of high quality alloy steel ingots. It is also claimed that probably nowhere else in the world will such a large tonnage of this type of steel be produced from a single furnace.

Eight recently introduced electrical products were the subjects of talks in the TV programme "About the Home." Our picture shows Joan Gilbert of B.B.C. and Mary Gilbert of E.D.A. during rehearsal. Appliances which appeared included a tea maker, an iron, oil-filled radiator and simmerstat switched socket-outlet

Press Entertained at Chloride Lunch

ONE of the notable features of the Motor Show, as far as Pressmen are concerned, is the annual luncheon given by Chloride Batteries Ltd. This year, 200 journalists representative of all sections of the press attended at the Clarendon Restaurant, Hammersmith. In the course of his remarks, Mr. H. V. Schofield, sales director, said that following the reduction in the price of lead, the company had lowered its prices to the public. Production during the year had been satisfactory but there were often delays through lack of bits and pieces, such as brass screws. The removal of controls on lead had resulted in the price of that commodity going down from £185 to about £85 per ton, from which fact Mr. Schofield concluded that many of the existing controls appeared unnecessary.

E.I.B.A. Hants Ball

THE Hants and Dorset branch of E.I.B.A. has announced that their third annual ball is to be held at the South Parade Pier Pavilion, Southsea, on February 6 next year. Tickets are priced at 12s. 6d. each and include running buffet and cabaret. They may be obtained from the hon. secretary, Mr. A. Cadman, British Electricity House, High Street, Portsmouth.

NEWS IN BRIEF

Directors of Higgs Motors Ltd. recently gave a dinner to senior employees at the Grand Hotel, Birmingham. About 400 attended.

Gloucester branch of E.I.B.A. ran a successful Ball at the Bell Hotel, recently.

Concerned at the increase in electricity tariffs, Weston-super-Mare borough council is to examine alternative methods of providing the power and services they require.

Electric Shutters to keep Trains Warm

THIRTEEN electrically operated shutters have been installed at London Transport's Hainault depot to protect tube trains parked in the open from freezing up during winter nights. Freeze-ups have previously been counteracted in these circumstances by keeping the trains heated. Asbestos fences were erected in the sidings to screen trains from icy winds. These fences have been turned into "boxes" for trains by installing the electric shutters across the rails to seal off the ends. Normally the shutters are kept raised, but each can be lowered in 20 seconds, boxing up the trains and protecting them from winds.

E. Midlands Electricity Board have opened a new service centre at 27 North St., Horncastle.

Purchasing Officers Association's E. London Branch opened its new season last week with a talk by Mr. H. H. C. Wood of Igranic Electric Co., Ltd., on "Purchasing for Production."

Annual dinner and smoking concert of Johnson and Phillips Foremen's Association took place at the McLeod Restaurant, on October 17. 145 attended.

Crypton Equipment Ltd. have just received from the Near East a single order for various automobile service equipment valued at about £20,000.

Estimated cost of the equipment for the installation of flashing lights on the beacons at the 437 controlled pedestrian crossings in Birmingham is £22,000.

A booklet dealing with the recruitment and training for its senior staff has been published by the United Steel Cos. Ltd.

British Council has just published its report for the eighteenth year of its activities —namely, 1951-52.

B.I.C.C. recently entertained about 350 members of their staff from branch offices in the North and Scotland, to a dinner, dance and cabaret at the Casino, Blackpool.

Questions in Parliament . . .

Opencast Mining

In a written answer last week, Mr. G. Lloyd stated that about 28,000 acres were under requisition for opencast mining during the nine months ending September 30. A further 20,000 acres from which coal had been won were being farmed, he added. Opencast mining was estimated to yield at least 11½ million tons of coal this year.

North Atlantic Cable

Mr. David Gammans stated that the disused North Atlantic cable had now been repaired and he understood from Cable and Wireless Ltd. that it had been brought into service again on September 29.

Transatlantic TV Relays

The House was told last week that it would be technically possible to relay television to North America, but practical problems and huge cost ruled out such an idea at present. In reply to a further question it was stated that the cost was estimated at £18 million.

Coronation TV Arrangements

In a statement last week on the development of television services, Mr. D. Gammans said permission had been granted for the establishment of stations at Pontop Pike and Belfast in time for the coronation. It had been found that temporary stations could be set up at much less cost than the schemes originally planned. Pontop Pike would be given first priority and N. Ireland next priority. An interim service would be provided by using mobile transmitters and temporary aerials. Technical resources would be strained to make these services available and he could make no

promises as regards other areas. Mr. Gammans added that the N. Ireland service would be radio link and so far as Pontop Pike was concerned, the link will be the co-axial cable which is in that area. Estimated cost of the two stations and the temporary arrangement was about £20,000 each.

In a written answer on Friday, Mr. Gammans corrected his previous statement by saying the service to N. Ireland would not be provided by the low-powered transmitter from Kirk o' Shotts.

Street Lighting Columns

The Minister of Transport stated on Friday that he was aware that the restrictions on steel allocations had resulted in a fall in output of steel street lighting columns. Larger issues of steel would be made as soon as there was an improvement in supply, he added.

Fuel and Power Policy

A number of questions were asked last week concerning the report of the Ridley Committee. In reply to one seeking information on steps proposed to be taken in connection with the committee's recommendations, Mr. Geoffrey Lloyd said he would make a statement on the matter in the coming fuel and power debate, mentioned in these columns last week.

Other questions concerned evidence given to the committee by the Board of Inland Revenue. Mr. Butler, replying to these, said the evidence referred to was a memorandum dealing with a specific point raised and was of an entirely different character to the evidence submitted by the F.B.I. and T.U.C. He did not consider it of sufficient general interest to be published. The Chancellor was also asked what action he was taking in connection with fiscal and financial proposals made by the committee. He said the proposals were being examined both by himself and the Minister of Fuel and Power.

Mr. R. Stokes asked whether it was intended to give any "encouragement" in the industrial field to the saving of fuel. To this Mr. Butler replied that this matter might have come up on the Finance Act had it been in order. He added there were difficulties which he could not detail then, but would be pleased to answer either a further question or have a talk with the questioner.

Domestic Fuel Rationing

The Minister of Fuel and Power was asked the cost of maintaining staff to ration domestic fuel and whether he would consider derationing fuel in view of increased stocks, bearing in mind that the price was rationing demand. The Minister said he would end controls, which cost about £1½ million a year, as soon as possible, but coal stocks were not sufficient to merit such an action this winter.

Inland Revenue Evidence

Another question, apart from those reported above, concerned the Government's policy as regards the submission of evidence by the Board of Inland Revenue to appointed committees. Why, it was asked, was evidence given by the Board to the Ridley Committee and refused in the case of the Gower Committee? The Chancellor replied that written evidence was submitted to both committees by the Board. It was sometimes considered, however, as in the case of the Gower Committee, that it would be undesirable for the Board to give evidence, particularly oral evidence, on major changes in taxation policy.

Building Authority

Mr. G. Nabarro asked last week what building licences had been issued to the Midlands Electricity Board during the year ending September 30; what new offices and showrooms had been licensed for building at Shrewsbury; and to what extent authority for the purchase of private houses was given. The Minister of Fuel and Power said no authorisations for showrooms had been issued, and only one for the erection of two huts costing £1,277 for use as offices. One authorisation had been given to the Board for adaptation of offices for service centres at Shrewsbury. That was early in 1950, for work to cost £2,780.

Westminster Hall Lighting

Parliamentary Secretary to the Ministry of Works stated there were two systems of lighting in Westminster Hall. General illumination was provided by pendant fittings and floodlights illuminated the roof. Much thought had been given to the installation by specialists and he considered the present system satisfactory. He had been asked whether he was satisfied with the scheme and whether diffused lighting could be installed to bring out the hall's beauties.

Power Supplies to Farms

Sir T. Dugdale stated in a written answer last week that he understood about 85,000 farms in Gt. Britain had been supplied with electricity as at April 1, 1948, representing some 24% of all farms. By July 1 of this year, the number of farms connected to the public mains had increased to about 126,000 or about 36% of the total number. He had no information as regards N. Ireland.

Rural Electrification

Asked to make a statement on the progress of rural electrification in the U.K., Mr. Geoffrey Lloyd stated that it was the Board's duty to serve the extension of electricity to rural areas. He said it was not possible to give detailed statistics on extensions to rural areas other than supplies to farms. This had already been given by the Minister of Agriculture (see "Power Supplies to Farms" above). Unlimited investments in the supply of electricity could not be allowed but rural investment had had its full share of available resources and the Government was well aware of the needs of rural areas.

Use of Lead and Zinc

Some postponement of purchases of lead and zinc had resulted from the fall in prices of those materials, stated Mr. Bottomley. He added that there had been economies in use and considerable substitution of recovered material for virgin metal had taken place in the case of lead.

Electric Supply News . . .

Glendale (Northumberland)

Representatives of the Rural Council are to meet the County Planning Officer and officials of the South-East Scotland Electricity Board regarding the supply of electricity to Lowick. The Board's proposal is to use overhead lines down the Main Street, but the Council has suggested that the lines should be placed as far as possible behind Main Street. The Board has pointed out that the Council's plan would increase the cost of the work.

Gloucester

About 200 yards upstream from the entrance to Gloucester Docks, two h.v. cables were last week laid under the River Severn by the Midlands Electricity Board. One is to operate at 33 kV and the other 11 kV, we understand.

Isle of Man

In its first year as a generating authority the Isle of Man Electricity Board sent out 13,689,861 units from its Peel power station to 8,559 consumers during the year 1950-51, it is shown in the report just published. Cost per unit produced, including 4,362,870 units purchased from Douglas Corporation was 1·085d., while the average price obtained was 1.93d. p.u. The Board's diesel station at Peel has been generating its full requirements since August 10, 1950. The net revenue account for the year under review showed a surplus of £1,377 which was transferred to the general reserve fund bringing that credit balance to £6,301. The auditors have not passed a sum of £611 10s. 5d., which they state was paid or credited to the engineer and secretary by the Board in excess of the authorised salary. They refer to negotiations for increased remuneration, but point out that no official authority for it had been produced at April 9, 1952. The auditors also observe that approval had not been obtained for the whole of the staff establishment, but that negotiations were proceeding.

Perth

Although the Perth Housing Committee recommended acceptance of an offer of the North of Scotland Hydro-Electric Board for the supply of electric cookers and washboilers, ex-bailie J. R. Christie objected at the recent council meeting and protested at the Board's decision to introduce a rental of 6s. per quarter for prepayment meters. He suggested that if the Board were not prepared to withdraw that decision, the Council should not recognise them as a contracting authority. The matter was remitted to the Housing Committee for further consideration.

Shetland

Shetland County Council has agreed to join with Lerwick T.C. in asking the North of Scotland Hydro-Electric Board to establish an experimental power plant in Shetland for generating electricity from peat fuel. The area suggested is known as the Lang Kames, a five-mile-long valley in the central mainland with almost unlimited supplies of peat moor. It was stated that the matter had been brought before a recent meeting of the Local Authorities Hydro-Electric General Committee at Inverness by Dean of Guild Arthur Johnson, representing Shetland.

Slough

As part of a £300,000 scheme to reinforce the local supply, a new 132 kV switching station is nearing completion at Chalvey Grove. This will tap the Uxbridge-Reading grid line.

South West

The South-Western Electricity Board is to be approached by the Holsworthy Rural Council concerning a supply of electricity to Milton Damerel and Ashwater. It was stated recently that a large number of people would take advantage of the supply if it were made available.

LIGHTING SCHEMES

Ashton-under-Lyme.—T.C. to apply for consent to borrow £2,432 for improving lighting in Manchester Road.

Blackpool. On the grounds of economy, the T.C. has cut a £200,000 programme of illuminations and a Coronation pageant next year. A plan for a revenue-producing Middle Walk lighting display was deferred, and the 1953 autumn illuminations allowance has been fixed at £70,000—some £560 less than the cost of this year's scheme.

Chester.—The Publicity Committee has recommended that a £3,500 floodlighting scheme should be arranged next year as part of the Coronation celebrations. The proposed scheme extends from the Market Square to the River Dee.

Croston.—The parish council has approved a new street lighting scheme to cost £3,000.

Gateshead.—T.C. has received loan sanction for £2,033 for the provision of 48 street lamps on the Wrekenton housing estate.

Hamilton.—Having been told that the position regarding maintenance of electric street lighting in the burgh was critical, the T.C. has decided to take over control of the system from the South West Scotland Electricity Board and to purchase a new tower wagon.

Liverpool.—The T.C. plans to spend £5,000 on a scheme of illuminations for the Coronation next year, the special committee has revealed.

Lyme Regis.—T.C. to apply for sanction to borrow £1,500 for new lighting in four roads.

Peterborough.—T.C. is considering a scheme for improved street lighting in Eye Road.

Company Activities . . .

Aberdare Cables, Africa

Net profit for the year to June 30 last is £182,962 (*£109,282*). The dividend is 15% (*10%*). To reserve for metals fluctuation nil (*£12,500*), contract contingencies £5,000 (*£12,500*), assets replacement £5,000 (*same*), and general reserve £100,000 (*£30,000*), leaving £22,462 (*£11,832*) carried forward.

Broadcast Relay Services

The offer of £1,888,247 5½% debenture stock, 1965-78 at par, was heavily over-subscribed, it is stated. Allotment letters went out on Tuesday.

Peter Brotherhood Ltd.

The net profit for the year ended March 31 last is £111,021 (*£143,292*) after deducting taxation of £157,000 (*£197,650*). The final dividend is 16% (*12%*) making 28% (*20%*). But for the threat of dividend limitation the final for the previous year would have been higher, and the distribution for 1951-52 includes 4% in respect of 1950-51, it is stated.

Electric and Musical Industries

The consolidated net profit of this concern and its subsidiaries in England and British overseas territories for the year to June 30 last is £402,365 (*£663,000*) after providing £764,500 (*£959,000*) for taxation. The dividend is 12% (*same*).

Ferranti Ltd.

After charging taxation of £645,000 (*£646,000*), the group net profit for the year to June 30 last is £529,208 (*£540,129*). The Ordinary dividend is again 6%. At the meeting on November 20, a resolution will be proposed to increase the company's borrowing powers from the present £3 million to £5 million, including moneys borrowed by subsidiaries.

Morphy-Richards Ltd.

The full report shows consolidated current assets totalling £674,128 (*£615,495*), of which stock in hand and work in progress, at or below cost, amounts to £361,676 (*£355,425*). Current liabilities are listed at £286,274 (*£308,677*) including sundry creditors and accrued charges of £150,353 (*£199,647*). The chairman's statement indicates that sales of the parent company in the year to June 30 last were maintained. The decline in group profits reflected a fall in Canadian turnover which turned a very satisfactory profit in 1950-51 into a loss, and was responsible for the reduction of about £65,000 in the past year's consolidated profit. Mr. G. Wansbrough, chairman, states that the increased production of electric irons, after meeting as much as possible of the export demand, is still insufficient to satisfy the needs of the home market. The output of automatic toasters has also been raised.

Perak River Hydro-Electric Power Co.

Net profit for the year ended July 31 last is £514,616 (*£568,004*) after charging £250,000 (*£107,150*) to depreciation. With £100,626 (*£84,863*) brought in, plus tax and bad debts provisions no longer required £207,500, the total available is £822,742. Taxation absorbs £381,839 (*£300,000*), to general reserve £75,000 (*nil*), and fuel equalisation nil (*£103,833*). It is proposed to pay the preference dividends for the last eight years to July 31 last, requiring £262,500. But there is again no distribution on the Ordinary shares.

Strand Electric Holdings

The consolidated gross trading profit for the year to April 30 last amounts to £293,997 (*£273,894*) plus rents receivable £968 (*£1,246*). After charging expenses, research, maintenance, pensions and taxation of £40,517 (*£34,794*), the net profit is £24,407 (*£21,913*). To general reserve £7,500 (*£7,000*), hire stock reserve £3,512 (*£1,714*), amortisation of loan reserve £2,131 (*nil*), and after payment of dividend there is £7,975 (*£7,277*) carried forward. In the opinion of the board, a reduction of turnover and profit, if not necessarily of dividend, in respect of the current financial year is probable, Mr. J. D. H. Sheridan, the chairman, states. Overseas business is limited by the restricted imports policy adopted by many governments. It may be that restriction of imports can temporarily relieve the economic problem of any particular country but if many countries adopt it as a policy, it must cease to have any merit. On the contrary, it can only result in intensification of the process of strangling trade, he adds.

Dividends Declared

Barton and Sons.—Interim of 5% (*same*).

British Electric Traction.—Interim of 10% (7½%) on the Deferred Ordinary and "A" Deferred Ordinary.

Brush Electrical Engineering Co.—Interim Ordinary dividend of 4% (*same*) payable on December 6. The directors point out that during the early part of 1952 total profits were satisfactory; the company is now experiencing the trading difficulties confronting much of the engineering industry. And with the closing of certain export markets, it is anticipated that there will be a not inconsiderable reduction in profits for 1952 compared with 1951. But the group has a substantial volume of orders, and the directors consider that trading should be on a satisfactory level next year.

Dowding and Mills.—Dividend is again 50%. The net profit is £16,746 (*£15,032*).

Ever Ready Co. (Gt. Britain) Ltd.—Interim Ordinary dividend of 15%, payable on December 1.

Hopkinsons Ltd.—Interim of 10% (7½%).

Commercial Information

CONTRACTS OPEN

HOME

Oct. 31.—Northern Ireland. Installation of lighting and bell-push systems at Coleraine Hospital. Secretary, Coleraine and Portrush Management Committee, Coleraine Hospital.

Oct. 31.—Wakefield. Supply and erection of (*a*) 28 100 W tungsten lamps and 15 ft concrete columns on Kettlethorpe estate, (*b*) 60 125 W H.P.M.V. lanterns on same along Thornes and Batley Rds., and (*c*) 15 125 W H.P.M.V. lanterns on same in Agbrigg Rd. City Engineer, Town Hall. (See Oct. 2 issue.)

Nov. 3.—Bath. Supply and installation of equipment (washing machine, etc.) for communal laundry in block of 42 flats. Jared E. Dixon, Town Clerk, Guildhall. (See Oct. 23 issue.)

Nov. 3.—Dundee. Electrical work in reconstruction of workshops and stores for Scottish Gas Board at Dundee. W. S. Johnston, Group Manager, Gas Works, 50 East Dock St., Dundee. Deposit £1 1s.

Nov. 3.—Fife. Electric installations at seven schools and various adjoining premises. County Architect, County Bldgs., Cupar.

Nov. 3.—Longbenton U.D.C. Electrical work in 20 houses on Wideopen estate. A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

Nov. 3.—Manchester. Alterations and additions to electrical installation at Queen's Rd. bus garage. City Architect, Town Hall. Deposit £1 1s.

Nov. 3.—Northern Ireland. Electrical installations in 8 shops, 26 flats and 26 old people's dwellings at Tonagh Park, Lisburn, N. Ireland Housing Trust, 12 Hope St., Belfast. Deposit 10s.

Nov. 3.—Redcar T.C. Supply of 14 units with beacons, lampholders, switchgear for a.c. mains and posts for pedestrian crossing lighting. H. Caldwell, town clerk, Municipal Bldgs.

Nov. 3.—Swansea T.C. Electrical installation in 116 houses on Chase estate. Applications by above date to Borough Architect, The Guildhall. Deposit £2 2s. (See Oct. 23 issue.)

Nov. 3.—West Hartlepool T.C. Electrical installation in 216 flats on Owton Manor Estate. Borough Architect, A. G. Sinclair, Municipal Buildings.

Nov. 5.—Swansea T.C. Electrical installation in 56 flats at Penlan. Applications by above date to Borough Architect, The Guildhall. Deposit £2. (See Oct. 16 issue.)

Nov. 6.—Pontardawe R.D.C. Supply and erection of 63 columns and lanterns, and supply of 69 lanterns and brackets for sodium lighting scheme. Engineer and Surveyor, Council Offices. Deposit £2 2s.

Nov. 7.—Antrim. List of supplies required by S. Antrim Hospital Management Committee for 1953 includes electrical repairs and requisites. Secretary of Committee, Dublin Rd., Lisburn.

Nov. 7.—Belfast. Electrical installation at Methodist College. J. R. W. Murland, consulting engineer, 13 Wellington Place. Deposit £5 5s.

Nov. 7.—Durham. Electrical installation in Barnard Castle controlled school and Walworth Castle special school. Applications by above date to County Architect, G. R. Clayton, Court Lane.

Nov. 7.—Fife. Improvements to classroom lighting at Buckhaven High School and Aberhill junior secondary school. County Architect, County Bldgs., Cupar.

Nov. 7.—Hornchurch U.D.C. Provision and installation of equipment for illumination of nine pedestrian crossings. Engineer and Surveyor, Council Offices.

Nov. 7.—Manchester. Electrical installation at 60 Palatine Rd. for Children's Committee. City Architect, Town Hall. Deposit £1 1s. (See Oct. 2 issue.)

Nov. 8.—Liverpool. Supply of equipment for lighting about 120 pedestrian crossings. City Engineer and Surveyor, Municipal Bldgs. (See Oct. 23 issue.)

Nov. 8.—New Windsor T.C. Supply of (among other items) electric lamps, fittings and cable for 1953. G. S. Baker, Borough Engineer, Kipling Memorial Bldg., Alma Rd.

Nov. 8.—Tewkesbury T.C. Supply and installation of 400 W mercury lamp units along 2,700 yd. of A.38. Separate tenders invited for (*a*) 13 concrete columns, one wall bracket and resiting of existing columns; and (*b*) 61 lanterns and auxiliary gear. Engineer and Surveyor, Municipal Offices. Deposit £2 2s.

Nov. 10.—Birmingham. Alterations and additions to lighting and power installations at Highbury Hall. H. J. Manzoni, city engineer and surveyor, Civic Centre. Deposit £2 2s.

Nov. 10.—Dewsbury T.C. Supply of a 4,000 g.p.m. vertical spindle centrifugal sewage pump, and two 2,000 g.p.m. and one 1,000 g.p.m. horizontal centrifugal recirculating pumps, with motors and all ancillary electrical work and equipment. Borough Engineer and Surveyor, Municipal Bldgs.

Nov. 10.—Goole (Yorks) T.C. Electrical work in (*a*) 31 houses and six bungalows in Oxford Rd. and Ilkeston Ave., and (*b*) 79 houses in Murham and Ilkeston Aves., etc. Thos. Waterfall, Borough Surveyor, Municipal Offices. Deposit £2 2s.

Nov. 10.—Grantham T.C. Supply of equipment for lighting pedestrian crossing beacons. Borough Engineer, Guildhall.

Nov. 10.—Leyton T.C. Provision and fitting of 40 dish refractor lanterns with magnetic deflector for 400 W H.P.M.V. lamps; also supply and erection of six concrete columns. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Nov. 10.—Mablethorpe and Sutton U.D.C. Supply, erection and maintenance of pumping machinery for unscreened sewerage, each set complete with electric motor and automatic switchgear. Documents from Council Offices or from consulting engineers, Silcock and Simpson, 10 Park Row, Leeds. Deposit £5.

Nov. 10.—Radcliffe T.C. Installation of electrical services in 60 houses and 12 maisonettes in Milton Road scheme. Borough Engineer and Surveyor, Town Hall.

Nov. 10.—Sunderland T.C. Supply of equipment for lighting pedestrian crossings including 72 flasher units, plastic and glass beacon globes, steel poles and lampholders. Town Clerk, Town Hall. (Advertised in this issue.)

Nov. 11.—Bridgwater T.C. Supply and installation of electric motor with ancillary switchgear and cables at Ashford waterworks pumping station. R. A. Watson, Borough Engineer, Town Hall. Deposit £1 1s.

Nov. 12.—Manchester. Supply of 200 flashers for illumination of pedestrian crossing beacons. City Surveyor, Town Hall. Deposit £1 1s.

Nov. 13.—Ellesmere Port U.D.C. Tenders invited for lighting of pedestrian crossings. Council's Engineer and Surveyor, Queen St. Deposit £1 1s. (See Oct. 23 issue.)

Nov. 13.—Southall T.C. Provision of 63 lanterns with 140 W sodium lamps and ancillary equipment, and also 63 concrete columns including erection and installation of electrical equipment. These may be separate contracts. Borough Engineer, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Nov. 14.—Manchester. Electrical installation in Central Kitchen, Crossley St. City Architect, Town Hall. Deposit £1 1s. (See Oct. 16 issue.)

Nov. 17.—Edinburgh. Electrical and heating installations in Carrick Knowe primary school. City Architect, City Chambers.

Nov. 17.—Stretford T.C. Electrical installation in 146 flats and maisonnettes on Stretford Rd. and Thomas St. sites. A. H. Perry, Borough Surveyor, Town Hall. Deposit £2 2s.

Nov. 18.—Ilford T.C. Supply of 20 a.c. and 20 d.c. flasher units with housings and 20 housings for interconnecting with d.c. flashers; and also 60 globes, galleries and lampholders for pedestrian crossing lighting. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Nov. 19.—Tyrone. Electrical installation at Kilskerry primary school. A. Gibson, chief education officer, Education Offices, Omagh. Deposit £2 2s.

Nov. 21.—Belfast. Supply and erection of workshop machinery equipment, including 12¾ in. and 6¾ in. centres surfacing and screwcutting of gap bed lathes, radial drilling machine, sensitive drilling machine, and 24-in. shaping machine, for Harbour power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Oct. 23 issue.)

Nov. 22.—Wakefield R.D.C. Electrical installation in 58 houses on sites within the rural district. Council's Engineer, Council Offices, 18 St. John's North.

Nov. 24.—Boston R.D.C. Electrical pumping machinery required for Bulterton Re-Pumping Station. S. M. Forman, clerk of district council, 126 London Rd. Deposit £3 3s.

Nov. 25.—Newbiggin-by-the-Sea U.D.C. Electrical work in 12 houses on Spital Estate. H. Selby Robson, Surveyor to Council, Council Offices. Deposit £2 2s.

Nov. 28.—Stepney B.C. Electrical installation in blocks of flats in Sidney St. scheme. Sydney Clough, Son and Partmers, Devonshire Close, 39 Devonshire St., W.1. Deposit £2 2s. (See Oct. 23 issue.)

Nov. 29.—Stalybridge T.C. Conversion of street lighting from gas to electricity, comprising supply of swan necks to existing columns, new concrete columns, 80 W H.P.M.V. lanterns, time switches, etc., for some 420 lamps. G. D. Sanderson, Borough Engineer, Town Hall.

Nov. 30.—Tottenham B.C. List of supplies required during year beginning April 1, 1953, includes electric lamps. Applications to M. Lindsay Taylor, Town Clerk, Town Hall, N.15.

Dec. 10.—Ilkley U.D.C. Installation of mercury lighting (involving 62 columns) in new street lighting scheme. Council's Surveyor, Town Hall. Deposit £3 3s.

No date stated.—Midlothian. Electrical installation at new primary school and clinic at Danderhall, Dalkeith. County Architect, 32 Palmerston Place, Edinburgh.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

Nov. 21.—Formosa. Supply of small quantities of scientific instruments, apparatus and supplies comprising 46 items required by Central Trust of China, 96 Po Ai Rd., Taipei, Taiwan. B.o.T. (Ref.: CRE 35301/52).*

Nov. 24.—India. Supply of meter testing laboratory equipment and instruments for substations and transmission lines for Jog-Karnatak electric grid scheme. Documents from Divisional Accountant, Bombay Electric Grid, Mercantile Building, Bombay, up to Nov. 15. Cost of set Rs. 5.

Your Queries — Answered

Floor-scrubbing machine with horizontal drum-type brushes, makers of? T.B.—Morphy-Richards, Ltd., Cray Ave., St. Mary Cray, Kent. (24237)

"Bartric" immersion heaters, makers of? J.C.—Try J. C. Bartlett, 208 Chingford Mount Rd., E.C.4. (24246)

Rubber shrouds for lampholders, makers of? B.E.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2; British Thomson Houston Co., Ltd., Crown House, Aldwych, W.C.2. (24252)

Bulle Products, Ltd., address of? A.C.—South Rd., Hailsham. (24271)

"Silovac" vacuum cleaners, suppliers of? N.W.—C.C.A. (Vacuum Cleaners) Ltd., 109 South St., Ponders End, Middx. (24259)

"Telavox" clocks, makers of? A.H.—Telavox Radio, 31 Apollovej, Copenhagen Vanloese, Denmark. (24265)

"Pyrobest" flexibles, makers of? W.E.—W. T. Henley's Telegraph Works Co., Ltd., 51 Hatton Gdn., E.C.1. (24277)

"Coffeemaster" coffee maker, suppliers of? E.C.—Ewart Catering Equipment Co., Ltd., Trojan Works, Kentish Town Rd., N.W.1. (24280)

The above are selected from questions we have answered this week. If you have a query send it to us.

Dec. 31.—India. Director of Supplies and Disposals invites tenders for unspecified number of house service electricity meters of various kinds. B.o.T. (Ref.: CRE 35026/52).*

Jan. 14, 1953. — Australia. State Electricity Commission of Queensland is inviting tenders for supply and erection of an 11 kV metal clad oil immersed fuse switchgear for Townsville Electricity Board. Secretary of Commission, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE 35647/52).*

Feb. 24, 1953.—Australia. Tenders invited for supply of four 80 MW generators and ancillary equipment, and four 110,500 b.h.p. Francis turbines and accessories for power station T-1 in Snowy Mountains H.-E. Authority. Authority is at 85 O'Riordan St., Alexandra, Sydney. B.o.T. (Ref.: CRE 35158/52).*

CONTRACTS PLACED

Basingstoke (Hants). Supply of electric lamps from Oct. 1 for Park Prewett Hospital Management Committee, Siemens Electric Lamps and Supplies Ltd.

Chesterfield. Electrical installation in nurses' home at Royal Hospital, N. R. Kirk and Co. Ltd., £1,198.

Leamington Spa T.C. Electrical work in 71 houses on Rushmere estate, Grensells Ltd., £1,218; same 109 houses in Bury Rd., and 89 on sundry other estates, L. W. Hodgkins, £2,626.

Leeds. Supply of sodium lanterns and control gear, Crompton Parkinson Ltd., £1,200.

London. Electrical installation at Monson primary school, Deptford, F. Lawrence.

Rotherham T.C. Supply of approx. 4 miles of trolley wire, B.I.C.C. Ltd., £1,890.

Sheffield. Electrical installation at Hurlfield secondary school, A. Holmes, £6,285; same in 652 dwellings on Hackenthorpe estate, 54 on Basegreen estate and 50 on Birley estate, M. J. Gleeson (Contractors) Ltd., £10,895.

Surbiton T.C. Installation of discharge lighting in Portsmouth and Surbiton Hill Rds., General Electric Co. Ltd., £2,962.

Worcester. Renewal of electrical installations at Victoria Institute Technical College, Midlands Electricity Board, £1,756.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	285 0 0	—
LEAD, good soft pig (foreign)	85 0 0	£108 0 0
,, ,, ,, "English" quality ...	86 10 0	
TIN (99-99.76%) ... ... (Cash)	950-952	—
,, (3 months)	937½-938	—
ALUMINIUM, commercial purity (del.)	166 0 0	—
ZINC	110 0 0	104 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.) ...	54 0 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Lewker Products Ltd., electrical and neon sign engineers of Putney, S.W.5. Last day for receiving proofs in respect of intended dividends, Nov. 8. Liquidator is D. F. Gay, Friars House, 39-41 New Broad St., London, E.C.2.

Southcombe and Willcocks Ltd. Resolution for voluntary winding-up passed at meeting on Oct. 15, when Sydney J. Renouf, Cert. Acc., Commercial Union Chambers, 1 St. Andrew St., Plymouth, was appointed liquidator

Medcalfe and Co., Ltd., Holborn, E.C.1. Last day for receiving proofs in respect of intended dividends, Nov. 8. Liquidator is J. W. Clement, 59 New Cavendish St., W.C.1.

Gordon Hughes Electrical Co., Ltd. Resolution for voluntary winding-up passed at meeting on Oct. 20. David A. Owen, 21 The Parade, Leamington Spa, was appointed liquidator. It was also resolved that Mr. Owen be authorised to consent to registration of new company under same name.

H. E. Hawley (Stoke-on-Trent) Ltd. At meeting on Oct. 2, resolution passed for voluntary winding-up. Archibald Wood, Inc. Acc., 12 Price St., Burslem, Stoke, was appointed liquidator, to whom creditors are required to send particulars by Nov. 14.

S.I.M. Electrical Co., Ltd. Meetings of members and creditors are to take place at 10 Peacock Lane, Leicester, on Nov. 28, at 11.30 a.m. and 11.45 a.m. resp., to receive liquidator's report.

BANKRUPTCY ACTS

Public Examination

Windsor. Henry M. Pollen, electrical engineer of 22 Riverside Close, Staines, Middlesex. Public exam. will take place at Court House, St. Leonard's Rd., Windsor, on Dec. 10 at 11.30 a.m. First meeting took place yesterday (Wed.).

Intended Dividends

Barnsley. Sydney E. Jones and George W. A. E. Short, trading as S. E. Jones and Co., dry battery manufacturers, at 20 Back Stubbin, Elsecar. Last day for receiving proofs, Nov. 5. Trustee is John B. G. Moore, Official Receiver, 55 Queen St., Sheffield.

Receiving Order

Brentford. Lionel J. Quick, electrical distributor, trading at 2 The Mall, Ealing, W.5. Receiving order dated Oct. 21.

First Meeting

London. J. Dennis, electrical contractor of 51 Ilbert St., W.1. First meeting to be held at Bankruptcy Bldgs., Carey St., W.C.2, at 12 noon on Nov. 5, and public examination at same address on Dec. 4, at 11 a.m. Date of receiving order, Oct. 17.

Order Rescinded

Sheffield. Hubert L. Ruff, electrical engineer, trading at 141 Abbeydale Rd., Sheffield. Receiving order dated March 9, 1936, rescinded and petition filed on same date dismissed. Debts paid in full. Date of rescission, Oct. 9.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Advance. 706,657. Class 9. Electric signal generators, testing and measuring apparatus, transformers and coils for high and low frequencies, etc. Advance Components Ltd., Advance Works, Back Rd., Shernhall St., E.17.

Diamex. 710,026. Class 9. Electric accumulators. Diamex Ltd., 1 Norfolk House, Laurence Pountney Hill, E.C.4.

BUSINESS PROSPECTS

HOME

Adwick-le-Street U.D.C. It is proposed to convert Old Rectory into council offices at estimated cost of £3,480.

Angus. A £14,000 fire station is to be built at Kirriemuir.

Aylesbury T.C. Approval sought for erection of 54 dwellings off Hartwell Rd. and 120 flats in Buckingham Rd.

Belfast. Erection of intermediate school in Crumlin Rd. W. H. McEvoy, quantity surveyor, Ulster Bank Chambers, 73 May Street.

Bromley (Kent) T.C. Plans approved for 107 houses on Hayes Place estate and 28 on Blackbrook estate.

Cambridgeshire. Scheme approved for erection of grammar school wings at Sawston and Impington Colleges. Estimated cost £73,180.

Carshalton (Surrey) U.D.C. Erection of 70 flats on Barrow Hedges estate. C. H. Durrant, clerk, Council Offices, The Grove.

Cheltenham T.C. It is proposed to build 323 flats, and eventually add a further 82 dwellings.

Coatbridge T.C. Approval given for 68 houses and 16 blocks of houses on Kennelburn site.

Cork. Next year, it is proposed to build a total of 328 houses on five sites. Largest group is 115 houses in Mount Pleasant Road.

Coventry. Approval received for erection of first part of Sandy Lane bus garage.

Dover T.C. Construction of 32 flats at Durham Hill. Borough Engineer, Brook House, Dover.

Enfield (Middx.). Plans in hand for extensions and adaptations at county school. Estimated cost is £103,090.

Essex. Gt. Baddow junior, Broomfield secondary and Sandon secondary schools have been included in next year's programme.

Frome (Som.) U.D.C. Fifty-six flats and houses to be built on Rodden site.

Grangemouth. Dean of Guild Court has approved extensions to I.C.I. factory costing about £80,000.

Harwich (Essex). Approval granted for erection of first part of Hill secondary school at Dovercourt. Estimated cost is £100,000.

Huddersfield. Crosland Moor junior school, to cost some £73,900, has been included in 1953-54 building programme.

Inverness. Primary school to be erected in Dalneigh housing scheme at estimated cost of £66,300.

Irvine (Ayr) T.C. Dean of Guild Court has approved erection of 64 houses in Irvine Mains scheme.

Isle of Ely. Erection of first instalment of Wisbech Further Education College has been approved. Cost estimated at £66,300.

Leamington Spa T.C. Approval sought for erection of 152 houses in Brunswick St.

Newton Abbot. Primary school at Milber has been included in next year's programme.

Nuneaton. Next year's building programme will include second instalment of College for Further Education, cost about £160,000.

Ottery St. Mary U.D.C. Erection of 38 houses in Longdogs Lane scheme. Council's Architect, A. R. Lamb, Town Hall.

Plymouth. Junior school to be built at Tamerton Valley.

Preston R.D.C. Construction of 60 houses and 20 flats at Penwortham. H. Collier, Council Offices, Guildhall St.

Renfrew. Scottish Aerodromes Board has approved final plans for construction of a £150,000 airport terminal.

Stamford T.C. Sixty houses to be built in district. Plans by Lenton and Partners, Broad St.

St. Ives (Hunts) T.C. Erection of 58 houses on Houghton Rd. E. Price Lavender, 17 The Broadway.

Suffolk. Modern school at Woodbridge (£95,000), and grammar and primary schools (£179,780) likely to be included in 1953-54 programme.

Tottington (Lancs.) U.D.C. Erection of 32 houses on Leeman's Hill site. Frank Bradley, Penny Bank Chambers, 4 Wood St., Bolton.

West Riding. Repairs and redecorations to Thorne primary school are estimated to cost £2,000.

Weymouth. Police station, estimated to cost £92,000, is to be built.

Worcester. Erection of first instalment of Dines Green primary school. Watkins and Decker, quantity surveyors, 13 Grays Inn Sq., London W.C.1.

Workington. Tenders likely to be invited soon for erection of 100 houses on Westfield estate.

Wortley R.D.C. Construction of 38 dwellings on Lane End estate. Council's consultants, Husband and Co., 388 Glossop Rd., Sheffield.

TRADE NOTES

Indian Imports. The Indian Government has now announced its import policy for various items omitted from the original schedule of goods to be imported in the next 12 months period. Squirrel-cage a.c. motors up to 50 h.p. do not need licences, but f.h.p. motors for d.c., parts of motors, insulation materials (except ebonite rods, tubes and sheets), bare copper wire, and table fans are licensable, but may be imported from the soft currency area only. Pedestal fans may be imported against licences for table fans.

Expansion. Building work has begun on a site adjoining the main offices and works of Birlec Ltd. at Tyburn Rd., Erdington, Birmingham. These extensions will provide additional drawing-office capacity and other facilities, whilst similar work at the other end of the factory will lengthen the existing works bays.

Acquisition. The Coltness Iron Co. Ltd. have accepted an offer of G. and J. Wier Ltd. for the purchase of their foundries and certain ancillary departments at Newmains.

New Branch. The telephone numbers of the Manchester branch of International Refrigerator Co. (to which we referred last week) are Blackfriars 8441/3 and 0377/8.

New Phone No. The telephone number of the London office of the Belmos Co. Ltd. has been changed to Chancery 5855.

Agent. Smart and Brown (Engineers) Ltd., 8 Rose and Crown Yard, King St., St. James's St., S.W.1, have become sole selling agents to the electrical trade of the "Darnalite" illuminated darning mushroom.

Zinc.—As from October 29 the price of good ordinary brand zinc was reduced by £8 to £110 per ton, delivered.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Magnetics (London) Ltd. To enter into agreement with Stanley I. Hitchcock, and acquire interests in any patents, brevets d'invention, licences, concessions and the like, and to carry on business of manufacturers of and dealers in dynamos, motors, etc. Cap.: £3,000. Dirs.: Not named. Subs.: J. D. H. Bankes and A. J. Murray, 5 Bishopsgate, E.C.2.

J. B. Martin (Redruth) Ltd., Treruffe Hill, Redruth. Service engineers and factors of and dealers in electrical and automobile equipment, etc. Cap.: £1,000. Dirs.: J. B. Martin and P. R. Giblett.

George Matthews Ltd., 15 Soho Sq., W.1. Retailers, wholesalers, manufacturers of and dealers in electrical goods and appliances, wireless and television sets and components, etc. Cap.: £1,000. Dirs.: G. E. Matthews and Dorothy M. Matthews.

Metal Fittings Ltd. General and electrical engineers and metal workers, etc. Cap.: £2,000. Dirs.: to be appointed by subs. Subs.: R. B. Sterry and G. Prince, 24 Martin Lane, E.C.4.

Otaco Ltd., 20 Essex St., Strand, W.C.2. Manufacturers of and dealers in goods made of glass, china, porcelain and pottery, electro insulators, etc. Cap.: £1,000. Dir.: O. Fischel.

Reason and Pickles Ltd., 21a St. Edmunds Rd., Northampton. Manufacturers, electrical and mechanical and general engineers, etc. Cap.: £5,000. Dirs.: A. E. Reason and Mrs. E. M. Reason, J. Pickles and Mrs. E. A. Pickles.

Reliance Transport Electrical Services (Sheffield) Ltd., 91 Loxley New Rd., Sheffield. To take over business of automobile electrical engineers and factors carried on at Sheffield by Dreke F. Ingledew and Douglas G. Ingledew. Cap.: £2,000. Dirs.: D. F. Ingledew and D. G. Ingledew.

Reilight, Ltd., 51 London Rd., Reigate, Surrey. Mnfrs. of and dlrs. in elec., electronic, gas and domestic goods, apparatus and equipment, etc. Cap.: £7,000. Dirs.: Mrs. J. C. Harris and G. T. W. Mould.

Rodway Jones and Co. Ltd., Broadmead House, 21 Panton St., S.W.1. To take over business of manufacturers of and dealers in electrical and water and other heaters carried on at 36 Station Rd., Westcliff-on-Sea, as "Rodway, Jones and Co." Cap.: £3,000. Dirs.: F. G. Jones and R. T. Baldwin.

S. and S. Electrical Ltd., 67/70 Ibex House, Minories, E.C.3. Electrical engineers and contractors, etc. Cap.: £100. Dirs.: H. Solomons and M. Souber.

Southborough Refrigeration Ltd., North End Chambers, 78 North End, Croydon. Manufacturers of and dealers in refrigerators and cold storage machinery, etc. Cap.: £1,000. Dir.: E. J. Nicholls.

Hugh Stephenson (Dunston) Ltd., 22 Ellison Rd., Dunston-on-Tyne. To take over business of plumber, electrical engineer and hardware merchant carried on at Dunston-on-Tyne by Hugh Stephenson. Cap.: £2,000. Dirs.: J. Adamson and Florence C. Adamson.

Sykes, Boxall and Co., Ltd, 132 Stanley Park Rd., Carshalton, Surrey. General engineers, engineering consultants, aeronautical, mechanical and electrical engineers, etc. Cap.: £3,000. Dirs.: to be appointed by subs. Subs.: F. W. Dymond, 30 The Ridgeway, Kenton, Harrow, and R. Meller, 4 Wanstead Place, Wanstead, E.11.

W. J. Taylor (Domestic Supplies) Ltd. Manufacturers of and dealers in television, wireless, gramophone and radio gramophone sets, vacuum cleaners, washing machines, etc. Cap.: £1,000. Dirs.: not named. Subs.: Dorothy M. Chester, 169 Church Lane, Handsworth Wood, Birmingham, 20; A. F. Pritchett, 18 Borwood Farm Rd., Wylde Green, Warwicks.

T.I.C. Transformers Ltd. Electrical transformer manufacturers, etc. Cap.: £1,000. Dirs.: R. G. Richardson and F. M. H. Taylor, addresses not stated. Subs.: Jean Herbert (co. dir.) and Claire Moore (sec.) 128 Albany St., N.W.1.

C. W. Tucker (Salisbury) Ltd., 400 Devizes Rd., Salisbury, Wilts. To take over business of radio, electrical and television engineer and retailer carried on as "C. W. Tucker" at Salisbury, Wilts. Cap.: £2,000. Dirs.: C. W. Tucker and A. S. Hall.

UltraVoltageTransmission Ltd. To carry out research upon, experiment in and develop processes or inventions for the transmission of electrical energy, and in particular electrical energy and high voltages, etc. Nom. cap.: £1,500. Dirs.: D. A. O'Duffy, N. F. Phillips, I. H. S. Pelling and H. E. M. Reay.

Univentions Ltd., 240 Luton Rd., Dunstable, Beds. Manufacturers of and dealers in engineering, electrical and mechanical plant, etc. Cap.: £2,000. Dirs.: W. Green, G. F. Baldock, and Annie L. Baldock.

Velocity Tools Ltd., Wigton House, St. John St., E.C.1. Manufacturers of and dealers in hand machine and electrical tools, drills, grinders, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs: G. M. Hydleman and S. Z. Manches, 206, St. John St. E.C.1.

W. and W. Development Designs Ltd., 4 Commerce Chambers, Richmond Rd., Kingston-on-Thames. Designers, manufacturers and distributors of scientific, electrical, mechanical, constructional and precision instruments, fine and small tools, etc. Cap.: £100. Dirs.: P. C. Wyett and P. L. Weeks.

Walker Ward (High Wycombe) Ltd. 64 Aldermanbury, E.C.2. Manufacturers, exporters, importers and wholesalers and retailers of and repairers of analytical and pharmaceutical instruments, electronic equipment, etc. Cap.: £1,000. Dirs.: to be appointed by subs. Subs.: Mrs. F. Walker, 1 Hatherleigh Lodge, Camden Rd., Morden, Surrey, and L. E. Ward, The Beeches, Marlow Hill, High Wycombe.

W. and N. Electronics, Ltd., 80/82 Uxbridge Rd., W.5. Cap.: £5,000. Dirs.: H. V. Davies and G. F. Hoptroff.

Watt Engineering Co. (Liverpool) Ltd., 5 Camden St., Liverpool. Aircraft, aeronautical, electrical, general and mechanical engineers, etc. Cap.: £1,000. Dirs.: G. J. Watt, Elaine E. Watt, J. K. Douglas, Hilda Baragwaneth, M. N. Hearn and M. G. Sherrard.

Wilovan Engineering Co. Ltd., 30 North John St., Liverpool 2. Manufacturers of and dealers in "Wilovan" electric and flexible drive powered hedge trimmers, etc. Nom. cap.: £2,000. Permt. dirs.: F. S. Donovan, Hilda G. Jones and J. H. Matthews.

MEETINGS TO NOTE

THURSDAY, OCT. 30

DUMFRIES ELECTRICAL SOC.—"Domestic Electrical Installations—Some Safety Aspects." H. W. Swann. Ewart Library, Dumfries, 7.30 p.m.

FRIDAY, OCT. 31

I.E.S. (Birmingham Centre).—"Evaluation of Lighting." R. G. Hopkinson. Regent House, St. Philip's Place, Colmore Row, 6 p.m.

I.E.S. (Cardiff Centre).—Annual supper dance at Royal Hotel.

MANCHESTER ASSOC. OF ENGRS.—Short ten-minute papers at Engrs. Club, Albert Sq., 6.45 p.m.

MONDAY, NOV. 3

A.S.E.E. (Leeds Branch).—"Television." H. B. Reeder. Gt. Northern Hotel, 7.30 p.m.

A.S.E.E. (N. E. London Branch).—"Motor Repairs." D. R. Reekie. Angel Hotel, Ilford, 8 p.m.

I.E.E. (London Students Section).—"Lightning." J. H. Gridley. Savoy Place, W.C.2, 7 p.m.

I.E.E. (Merseyside and N. Wales Centre).—"Domestic Electrical Installation: Some Safety Aspects." H. W. Swann. Liverpool Royal Instn., Colquitt St., 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Digital Computers and their Applications." Prof. F. C. Williams. King's College, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Centre).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest and F. J. Lane. James Watt Memorial Inst., Great Charles St., Birmingham, 6 p.m.

I.E.E. (Western Centre).—"Logical Approach to Problems of Electric Space-Warming." D. H. Perry. S. Wales Inst. of Engrs., Park Place, Cardiff, 6 p.m.

I.E.E. (Ipswich). — "Determination of Time and Frequency." Humphry M. Smith. Crown and Anchor Hotel, 6.30 p.m.

I.E.E. (Maidstone).—"Electronics in Balancing of Gas Turbine Engines." S. F. Bettinson. "Wig and Gown," 7.30 p.m.

SOC. OF ENGINEERS.—"Strain Measurements by Electronic Methods." S. F. Smith. Burlington House, Piccadilly, London, 5.30 p.m.

TUESDAY, NOV. 4

A.S.E.E. (Nottingham Branch).—"Modern Developments of Variable Speed Electric Drives." J. V. Woods. E. Midlands Elect. Board, Smithy Row, 7.30 p.m.

A.S.E.E. (W. London Branch).—"Use of Electricity in Gas Industry." Owen H. Baker. Windsor Castle Hotel, King St., Hammersmith, 7.30 p.m.

A.S.E.E. (S.E. London Branch)—"Electric Arc Welding." Congregational Church Hall, Court Rd., Eltham, 8 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (N.E. Coast Branch).—"District Heating in France." E. A. Pearce. Inst. of Mining and Mech. Engrs., Neville Hall, Westgate St., Newcastle, 6.30 p.m.

INCORP. PLANT ENGRS. (S. Yorks. Branch).—Annual dinner at Victoria Hotel, Sheffield, 7. p.m.

I.E.S. (Stoke-on-Trent Group).—"Planning an Industrial Lighting Scheme." V. A. Heydon. Elect. Board Offices, 31 Kingsway, 6 p.m.

I.E.E. (London Measurements).—Discussion on "Circuit Applications of Cold-Cathode Trigger Tubes." K. Kandiah. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland Centre).—"Inhibited Transformer Oil," W. R. Stoker and C. N. Thompson; also "Stability of Oil in Transformers," P. W. L. Gossling and L. H. Welch. Loughborough College, 6.30 p.m.

WEDNESDAY, NOV. 5

A.S.E.E. (N. London Branch).—"Tape Recorders." W. H. Y. Grainger. Three Jolly Butchers Hotel, Wood Green, N.22. 8.15 p.m.

BRITISH INSTN. OF RADIO ENGRS. (London).—"Standardised Units for Electronic Computers." A. D. Booth. School of Hygiene, Keppel St., W.C.1, 6.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (E. Midlands Branch).—"Thermal Behaviour of a Building." A. C. Pallot. Nottingham College of Arts and Crafts, 6.30 p.m.

INCORP. PLANT ENGRS. (Southampton Branch).—"Steam Utilisation." J. C. Chynoweth. Polygon Hotel, 7.30 p.m.

I.E.S. (Edinburgh Centre).—"Planning Lighting Installations." J. F. Roper. Lighting and Cleansing Dept., 357 High St., 7 p.m.

I.E.S. (Newcastle Centre).—"Architect's Approach to Artificial Lighting." R. G. Cox. Minor Durrant Hall, Oxford St., 6.15 p.m.

I.E.E. (Tees-Side sub-centre).—"Electricity in Farm Crop-Drying." C. A. Cameron-Brown and P. G. Finn-Kelcey. Cleveland Scientific and Technical Inst., Middlesbrough, 6.30 p.m.

I.E.E. (Southern Centre). — "Equipment of Battery-Electric Vehicles," W. D. Sheers; "Economic Basis of Battery-Electric Road-Vehicle Operation and Manufacture," H. W. Heyman. Polygon Hotel, Southampton, 6.30 p.m.

THURSDAY, NOV. 6

A.S.E.E. (S. London Branch).—"Radar Aids to Navigation." Gp. Capt. E. Fenessey. Cafe Royal, Croydon, 8 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section). "Development of Radio and Electronics Industry in India." G. D. Clifford. Engrng. Centre, Sauchihall St., Glasgow, 7 p.m.

I.E.S. (Birmingham Centre).—Ladies' Night.

I.E.S. (Glasgow Centre).—"Lighting of Shipyards." J. S. McCulloch. 39 Elmbank Crescent, 6.30 p.m.

I.E.S. (Nottingham Centre). — "Effect of Light in Growth and Development of Plants." Miss D. Vince. Elect. Board Offices, Smithy Row, 6 p.m.

I.E.S. (Bradford Group).—"Glass and its Manufacture." F. Mathers. Y.E.B. Offices, 45/53 Sunbridge Rd., 7.30 p.m.

I.E.S. (Exeter Group).—Brains Trust with E. A. W. Providence Hall, Northernhay St., 7 p.m.

I.E.E. (London).—"Telemetering for System Operation." R. H. Dunn and C. H. Chambers. Savoy Place, W.C.2, 5.30 p.m.

FRIDAY, NOV. 7

INSTN OF MECHANICAL ENGRS.—"Water Turbine Governors." N. G. Dennis. Storey's Gate, S.W.1, 5.30 p.m.

ASSOC. OF ELECTRICAL MACHINERY TRADES.—Annual Ball at Savoy Hotel (Lancaster suite), London, 6.45 p.m.

I.E.S. (Bath and Bristol Centre).—Brains Trust with E.A.W. Elect. Board Offices, Colston Ave., Bristol, 5.30 p.m.

I.E.S. (Huddersfield Group).—"Modern Aerodrome Lighting." J. W. Morse. Elect. Showroom, Market St., 7.15 p.m.

I.E.E. (N.W. Utilisation Group).—Dinner and dance at Apollo Cinema Restaurant, Ardwick Green, Manchester, 6.30 p.m.

I.E.E. (S. Midland Centre).—"Teaching of TV Servicing." R. G. Moseley. College of Technology. Birmingham, 7 p.m.

MONDAY, NOV. 10

LEICESTER ELECTRICAL SOC. — "Instruments: their Construction and Characteristics." J. Collins. Elect. Offices, Charles St., 7 p.m.

INCORP. PLANT ENGRS. (Dundee Branch).—"Something for Nothing in Heating." H. W. L. Tuckey and H. F. Taylor. Mathers Hotel, 7.30 p.m.

I.E.S. (Sheffield Centre).—'Application of Modern Flash Discharge Tubes." C. R. Bicknell. University, Western Bank, 6.30 p.m.

I.E.E. (London Education Circle).—Discussion on "Teaching of Illumination Engineering." S. S. Beggs, Savoy Place, W.C.2, 6 p.m.

I.E.E. (Merseyside and N. Wales Centre).—Annual dinner at Exchange Hotel, Liverpool, 6.30 p.m.

I.E.E. (N.E. Centre).—"Voltage Transformers and Current Transformers associated with Switchgear." W. Gray and A. Wright. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilisation Group). — "Inhibited Transformer Oil." W. R. Stoker and C. N. Thompson; also "Stability of Oil in Transformers." P. W. L. Gossling and L. H. Welch. Imperial Hotel, Birmingham, 6 p.m.

EXHIBITION DIARY

International Motor Exbn. 37th show opened at Earls Court on **Oct. 22** and closes on **Nov. 1.**

Handicrafts and Hobbies Exbn. First national show under this title opens at Central Hall, Westminster, on **Oct. 30** and closes on **Nov. 12.**

Public Works Congress and Exbn. Opens at Olympia, London, on **Nov. 3,** continuing until **Nov. 8.**

Business Efficiency Exbn. is to be held at Kelvin Hall, Glasgow, between **Nov. 4** and **14.**

What's behind the nameplate?

TWENTY-FIVE years' experience in design and manufacture and an output of **17,000,000 kVA** of transformers, in all types and sizes, including some of the world's largest.

Such figures are a true measure of excellence, for they could have been achieved only by the maintenance of the highest standard in design and construction and on a basis of long and reliable service.

REMEMBER POPPY DAY

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

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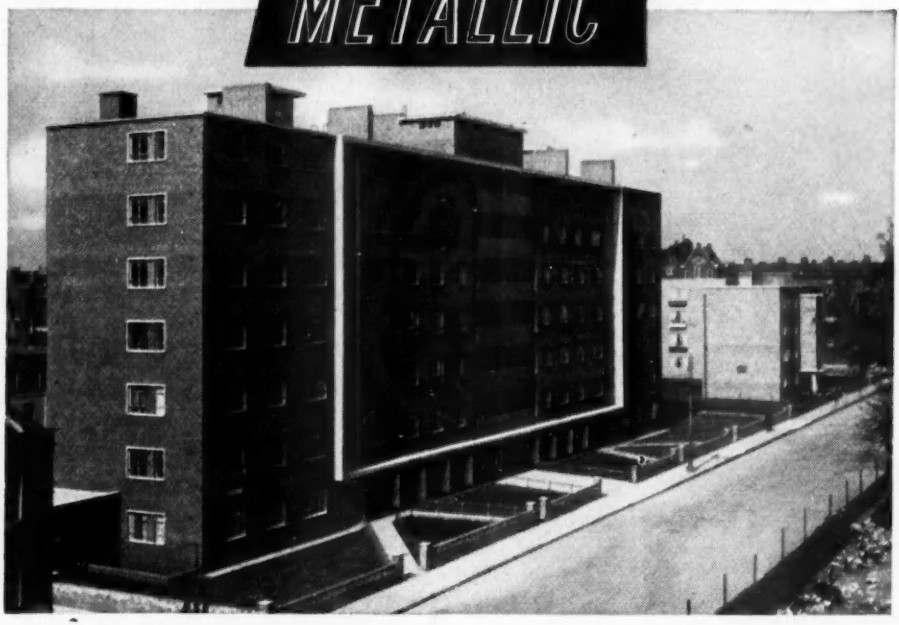

Godwin House, St. Marys Estate, Shoreditch.

(With acknowledgement to Shoreditch Borough Council and Iverson Electrical, Ltd.)

A TI COMPANY

It may be a school, it may be a factory—a power station or a housing estate, but more often than not the electrical specification will be—METALLIC.

This new block of flats is no exception, being fitted throughout with METALLIC conduit and fittings—unequalled for quality and consistent accuracy.

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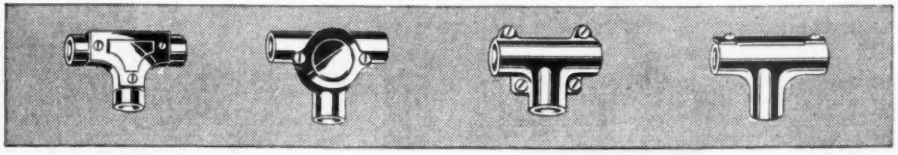

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

ELLESMERE PORT URBAN DISTRICT COUNCIL

CONTRACT NO. 138
PEDESTRIAN CROSSINGS—LIGHTING

TENDERS are invited for the lighting of pedestrian crossing beacons in accordance with Ministry of Transport Circulars Nos. 681, dated July 5, 1952, and 685, dated October 7, 1952.

Location map may be seen by appointment, and a set of tender documents, comprising conditions of contract, specification, bill of quantities, and form of tender, may be obtained at the offices of the Council's Engineer and Surveyor, Queen Street, Ellesmere Port, on and after Monday, October 20, 1952, on payment of a deposit of one guinea, which deposit will be refunded on the return of the contract documents, or, in the case of a bona fide tender which is accepted and not subsequently withdrawn, on completion of the formal contract between the council and the successful tenderer.

Sealed tenders in the plain official envelope provided, together with the contract documents, must reach the undersigned by not later than 12 noon on Thursday, November 13, 1952.

P. J. HODGES,
Clerk of the Council.

Council Offices,
Ellesmere Port.
October 14, 1952. (B 375)

BOROUGH OF ILFORD

PEDESTRIAN CROSSINGS: LIGHTING

TENDERS are invited for the SUPPLY of the following equipment in accordance with Ministry of Transport Circular No. 685.

(a) 20 a.c. Flasher Units complete with housings.
20 d.c. Flasher Units complete with housings.
20 Housings for interconnecting with d.c. flashers.
(b) 60 Globes, Galleries and Lampholders.

Copies of the specification, form of tender and general conditions of the contract for (a) and (b) may be obtained from the Borough Engineer and Surveyor, Town Hall, Ilford, on deposit of £2 2s. in respect of each contract, which will be refunded on receipt of a bona-fide tender not subsequently withdrawn.

Tenders in the endorsed envelope which will be supplied must be delivered to the Town Clerk, Town Hall, Ilford, not later than 4 p.m. on Tuesday, November 18, 1952.

The Corporation do not bind themselves to accept the lowest or any tender. (B 446)

BOROUGH OF LEYTON

Public Street Lighting

PROVISION OF LANTERNS AND CONCRETE COLUMNS

TENDERS are invited for the provision and fitting of 40 Dish Refractor Lanterns with magnetic deflector for 400 watt H.P.M.V. Lamps, together with raising and lowering gear in some instances; also for the supply and erection of 6 concrete columns.

Copies of the general conditions of contract may be inspected at the office of the borough engineer and surveyor, Town Hall, Leyton, E.10, from whom copies of the specification and bill of quantities may be obtained on payment of a deposit of £2 2s. which will be refunded following the receipt of a bona fide tender (not subsequently withdrawn).

Tenders are to be delivered to the undersigned in the envelope provided not later than 12 noon on Monday, November 10, 1952.

The Corporation does not bind itself to accept the lowest or any tender.

D. J. OSBORNE,
Town Clerk.

Town Hall,
Leyton, E.10. (B 445)

COUNTY BOROUGH OF SUNDERLAND

EQUIPMENT REQUIRED FOR PEDESTRIAN CROSSING FLASHING LIGHTING

THE CORPORATION are prepared to receive Tenders for the SUPPLY AND DELIVERY to the Corporation's Eden Vale Depot, Sunderland, for the undermentioned equipment, to be manufactured in strict accordance with Ministry of Transport Circular No. 685, Specification DS34922/2, DS34922/3, DS34922/4 and the appropriate British Standards.

(a) 72 Flasher Units suitable for 240 V 50-cycle mains supply, fitted with radio interference suppressors.

(b) 72 Housings for flasher equipment, type (a) of the Ministry's specification.

(c) 72 Beacon Globes (glass).

(d) 72 Beacon Globes (plastic).

(e) 72 Pole Top Globe Galleries fitted with anti-vibration springs, and e.s. lampholders.

(f) 72 3-in. o/d Steel Poles with type (c) of the specification.

Tenders may be submitted for all or any of the above items, and tenderers must state the anticipated date of deliveries.

Sealed Tenders, endorsed on the outside "Tender for Pedestrian Crossing Flashing Lighting Equipment," must be addressed to the Town Clerk, Town Hall, Sunderland, and delivered not later than November 10, 1952.

The Council does not bind itself to accept the lowest or any Tender.

G. S. McINTIRE,
Town Clerk.

Town Hall, Sunderland. (B 415)

BOROUGH OF SOUTHALL

IMPROVEMENT OF STREET LIGHTING IN LADY MARGARET ROAD

TENDERS are invited for the provision of the following:—

(a) 63 No. lanterns together with 140 W sodium vapour discharge lamps and ancillary electrical equipment.

(b) 63 No. concrete columns 25 ft. high, including erection, together with the installation of all electrical equipment and sundry excavation works.

Contractors tendering should allow for the fact that contracts may be let separately for (a) and (b).

Copies of Form of Tender, Specification and Bills of Quantities may be received from, and Conditions of Contract and Drawing inspected, at the office of the Borough Engineer, Town Hall, Southall, on payment of £2 2s., which will be returned on receipt of a bona fide tender.

Tenders should be delivered to the undersigned, together with all technical information required, in the envelope provided, which should bear no indication of sender, not later than 12 noon on Thursday, November 13, 1952.

The Council do not bind themselves to accept the lowest or any Tender.

J. S. SYRETT,
Town Clerk.

Town Clerk's Office, South Road,
Southall, Middx.
October, 1952. (B 416)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, inclusive of London Allowance, and conditions of service in accordance with N.J.B. Schedule "A."

ASSISTANT ENGINEER (OPERATION) (SHIFT)
Battersea Generating Station

Qualifications: Sound engineering training with considerable experience of large modern turbine plant. Duties wholly concerned with the operation of turbine house and ancillary plant. Salary, Class "L," Grade 11, £731 17s. p.a.

STATION SHIFT CONTROL ENGINEER
Deptford East Generating Station

Candidates should have suitable technical qualifications and previous practical experience in the control and operation of steam generating plant and h.t. switchgear. Salary, Class "H," Grade 10, £652 1s. p.a.

FIRST ASSISTANT STATION CHEMIST
Stepney Generating Station

Qualifications: Good knowledge of power station practice relating to examination of fuels, oils and water, and should preferably possess the Higher National Certificate in Chemistry. Salary, Class "G," Grade 9, £652 1s. p.a.

MAINTENANCE ENGINEER (MECHANICAL)
Lombard Road Generating Station

Candidates should have received a sound technical and practical training in mechanical engineering. Experience in maintenance of generating plant essential, including personal experience in the organisation and planning of overhauls of all station plant to a time schedule, keeping records of plant history and programming spares and stores. Salary, Class "F," Grade 6, £748 13s. p.a.

TECHNICAL ASSISTANT
Lombard Road Generating Station

Qualifications: Technical education up to Higher National standard and should be familiar with the preparation of operating returns and statistics. Initiative in dealing with plant efficiency work is important. Salary, Class "F," Grade 12, £512 p.a.

ASSISTANT SHIFT CHARGE ENGINEER
Blackwall Point Generating Station

Qualifications: Sound technical training with practical experience in the operation of a modern generating station, preferably with p.f. firing equipment. Salary, Class "F," Grade 9, £616 7s. p.a.

JUNIOR ENGINEER
Blackwall Point Generating Station

Qualifications: Sound technical training and preferably Higher National Certificate standard in Electrical Engineering or equivalent. Previous experience in generating station an advantage. Duties include operation and control, under supervision, of generating plant, and good opportunities will be offered for gaining experience with modern p.f. boilers, turbines and auxiliary plant. Applicants must be prepared to accept shift duties if required. Salary, Class "F," Grade 14, £456 p.a.

Applications must be made on forms obtainable from Divisional Secretary, B.E.A. London Division, Generation House, Great Portland Street, W.1, to be returned within 14 days of this advertisement. (B 435)

MIDLANDS ELECTRICITY BOARD

BIRMINGHAM and District Sub-Area requires an ENGINEERING DRAUGHTSMAN in the Sub-Area Engineer's Department. Applicants should be proficient in the preparation of Engineering drawings required for the construction and operation of transmission and distribution networks. Salary £413/£547 p.a. (N.J.B. Schedule "D," Grade 6), superannuable.

Apply within 14 days, stating age, experience, salary, and position, to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
(B 421)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

CROYDON "B" POWER STATION, ASSISTANT ENGINEER (MECHANICAL INSPECTING). The successful applicant will be responsible for the inspection of all mechanical plant during maintenance, assessing extent of work and preparation of reports on defective plant and maintenance of records. N.J.B. Conditions of Service and salary, Class "J," Grade 11, £649 19s. per annum including London allowance. Applications on forms obtainable from Station Superintendent, Croydon "B" Power Station, Beddington Farm Road, Purley Way, Croydon, Surrey, to arrive by November 10, 1952. (B 419)

HEREFORDSHIRE EDUCATION COMMITTEE

College of Further Education

APPLICATIONS are invited for appointment from January 1, 1953, as ASSISTANT LECTURER Grade "A" for Electrical Installation Work (City and Guild Course B). Work in Electrical subjects in Ordinary National Certificate groups also available to a suitable candidate.

Qualifications: Good trade experience, with City and Guilds and/or National Certificate qualifications. Teaching experience an advantage though not essential.

Further particulars and application forms (stamped addressed envelope) from the undersigned.

A. P. WHITEHEAD,
Director of Education.

County Offices,
Bath Street, Hereford. (B 431)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the post of MAINTENANCE SUPERINTENDENT, Poole Generating Station.

Applicants must have had considerable experience of the maintenance of all plant in a modern generating station, including boiler plant and the overhaul of large high pressure turbines with associated equipment, alternators, h.t. and l.t. switchgear, transformers and circulating water plant. Preference will be given to Corporate Members of one of the senior professional engineering Institutions or candidates holding appropriate equivalent qualifications. Housing accommodation may be available for the successful applicant.

Salary, N.J.B. Class "H.6," £808 to £841.

Application forms, obtainable from P. D. A. Oliver, Esq., Divisional Secretary, 111 High Street, Portsmouth, must be returned by November 12, 1952. (B 417)

NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of DEMONSTRATOR at Chester-le-Street District. Applicants should hold certificate of a recognised domestic science training college and/or E.A.W. certificate, and have had considerable experience of demonstration in the Electricity Supply Industry.

Salary (within Grade 1, £380/£470) and conditions of service in accordance with National Joint Council (Administrative and Clerical Grades) Agreement for the Electricity Supply Industry.

Applicants outside the Industry must apply to Local Employment Exchange. Applications in writing, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne 1, within ten days of the appearance of this advertisement. (B 418)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SHIFT CHARGE ENGINEER is required at Nechells "B" Power Station, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade "J.7," commencing at £792 per annum.

Higher National Certificate in Electrical and/or Mechanical Engineering required, together with sound experience in the operation and maintenance of large high pressure and high temperature boilers and turbines, and e.h.t. switchgear.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by November 15, 1952.

F. W. LAWTON,
Divisional Controller.
(B 436)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, THIRD ASSISTANT ENGINEER (CONSTRUCTION) in the West Central Sub-Area of the Board (Fforestfach).

Applicants should have had a regular engineering training and have experience of mains construction work, both overhead and underground. Experience of civil engineering work would be an advantage.

Salary in accordance with Class "K," Grade 10 (£699 to £713 to £726) of the N.J.B. Schedule.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary, to arrive by November 12, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (B 413)

SOUTH EASTERN ELECTRICITY BOARD

LINESMAN (OVERHEAD POWER)
Weald District, Hawkhurst, Kent.

WAGES 3s. 3½d. per hour for 44-hour 5-day week under N.J.I.C. Agreement. Applicants should have experience in the construction and maintenance of 11 kV and l.v. overhead lines.

Applications, giving two referees, must reach W. R. Abram, Weald District Manager, Highgate, Hawkhurst, by November 10, 1952.

ASSISTANT ENGINEER
Herne Bay-Canterbury District.

Salary £613 to £623 p.a. under N.J.B. D.7. Superannuable. Applicants should be qualified with a sound general and technical education and experienced in the design, construction and maintenance of h.v. and medium pressure overhead and underground distribution systems, and in the operation of a d.c. network including the maintenance of rotary substations and in d.c.-a.c. changeover. Duties will involve standby.

Applications, giving two referees, must reach A. J. Hunt, Joint District Manager, SEEBoard, 65 Mortimer Street, Herne Bay, by November 10, 1952.

A. L. BURNELL,
Secretary.

October, 1952. (B 432)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

JUNIOR ENGINEER, N.J.B. Conditions, Grade H17, £375/£387, to Grade H.14, £479/£496 per annum, according to experience and qualifications.

The duties will be assisting in the operation and maintenance of an underground system consisting of l.v. a.c. and d.c. networks, 6·6 kV and 33 kV systems, rotary and transformer substation plant, fault location, protective gear testing, planning and estimating l.v. network extensions. The applicants should have reached Higher National Certificate standard.

The position is superannuable and subject to a satisfactory medical examination.

Applications, in writing, stating age, education, qualifications, experience and present position, should be received by the undersigned within fourteen days.

G. T. ALLCOCK,
Sub-Area Manager.

Dewar Place, Edinburgh 3. (B 420)

GOVERNMENT OF KUWAIT

DIESEL POWER STATION SHIFT ENGINEERS required for service with the Government of Kuwait, Persian Gulf. Applicants should have some technical qualification and should not be more than 35 years of age. They should have good experience in the operation and maintenance of diesel engines and generators, and also have sufficient electrical knowledge of an A.C. distribution system to be able to operate the power plant in the station efficiently. Steam power plant operation experience would be advantageous, as at a later date a steam power station will be operating and a transfer of the services of the diesel power station shift engineers to the steam station might be arranged.

Commencing consolidated salary offered is at the rate of £1,500 per annum, according to experience. Free furnished quarters and free medical attention are provided. The first year will be probationary, and if satisfactory, home leave will be granted at the end of three complete years service. Married accommodation cannot be promised within one year.

Applications, in writing, giving full particulars of training, qualifications and experience, should be addressed to the Secretary, Ewbank and Partners, Ltd., 10-11 Grosvenor Place, London, S.W.1. (B 381)

UNIVERSITY OF ROORKEE, INDIA

APPLICATIONS are invited for the Chairs of Mechanical and Electrical Engineering.

The University of Roorkee is a newly-constituted engineering university and persons with the necessary qualities and background to develop successfully the Departments of Mechanical and Electrical Engineering are therefore required. Candidates should have good academic qualifications and professional standing, adequate research experience, either university or industrial, and experience in lecturing or teaching.

The terms and conditions of appointment proposed are initial contract for five years. Salary between Rs. 3,000-4,000 a month (£2,700-£3,600 per annum). Provident fund or continuance in the F.S.S.U. Scheme. Facilities to maintain international contact.

Further particulars and application forms obtainable from High Commissioner of India (General Department), India House, Aldwych, London W.C.2, quoting reference 9/2K. Last date of application, December 31, 1952. (B 444)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 5 (Wakefield) Sub-Area

SENIOR ASSISTANT ENGINEER
(Construction) (Vacancy No. 106/52)

Applicants should have wide experience in programming and supervising substation construction, underground and overhead system construction at all voltages up to 66 kV, and be capable of taking administrative control under the Sub-Area Engineer for the Sub-Area Construction Section. Some knowledge of building and civil engineering work would be an advantage.

Applicants should be Corporate Members of the Institution of Electrical Engineers, or hold equivalent qualifications.

Salary: N.J.B. Class "K," Grade 4, £1,068/£1,115 per annum.

Standard application forms may be obtained from the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, and should be returned not later than November 13, 1952.

No. 2 (Huddersfield) Sub-Area

SECOND ASSISTANT ENGINEER
(Meters, Testing and Protection) (Vacancy No. 90/52)

Applicants should be Corporate Members of the Institution of Electrical Engineers, or possess equivalent qualifications and should have a thorough knowledge and experience of all classes of meter repairing and testing commissioning and maintenance of protective gear and mains fault location.

Salary: N.J.B., Class "K," Grade 7, £844/£881 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, not later than November 13, 1952.

No. 6 (Hull) Sub-Area

Goole District.

SECOND ASSISTANT DISTRICT ENGINEER
(Selby) (Vacancy No. 99/52)

Applicants should have had sound practical experience in the operation, maintenance, planning and construction of h.v. and l.v. underground and overhead lines and substations in an extensive rural area.

Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications.

The successful candidate would be required to undertake standby duty and to reside in Selby.

Salary: N.J.B., Class "D," Grade 7, £613/£23 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire, Electricity Board, Ferensway, Hull, not later than November 13, 1952. (B 417)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the Islington District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, preferably being Corporate Members of the I.E.E., and possess a practical experience of all branches of engineering work associated with the organisation of a district distribution department, particularly in regard to mains and substations on both single and three-phase systems.

The post is graded under Schedule "A" of the National Joint Board agreement as Class "F," Grade 7, £710 17s. 0d. per annum rising to £730 16s. 0d. per annum, inclusive of London Allowance.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by November 12, 1952. Please enclose addressed foolscap envelope and quote Ref. V/1535/T on all correspondence. (B 434)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

COMMERCIAL ASSISTANT required in the Birkenhead District. Salary £553 to £576 (N.J.B. G.11).

Applicants should have had a good engineering training and previous experience of consumers' enquiries and problems, installation work and general duties of a commercial nature, and should be in possession of the National or Higher National Certificate in Electrical Engineering.

The appointment will be superannuable and subject to medical examination.

Application forms obtainable from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester, quoting reference 77A. Closing date November 10, 1952. (B 412)

CROWN AGENTS FOR THE COLONIES

APPLICATIONS are invited for the post of GENERAL MANAGER to the Central Electricity Board, Mauritius, which is at present being constituted to control and develop the electricity supplies in the Colony. Appointment is for three years in the first instance on a fixed salary, according to qualifications and experience, in the scale equivalent at present Government rate of exchange to £1,875 to £2,250 a year (including all allowances). A Provident Fund or Pension Scheme will be established. Free passages are provided. Candidates should be over 35 years of age, and be Corporate Members of one of the Senior Engineering Institutions, or possess equivalent qualifications. They must have had experience in the administration and management of public electricity supply undertakings, and have sound technical knowledge of the construction and operation of electricity supply systems including hydro-electric and diesel engine generation, and transmission and distribution at 22 kV, 6·6 kV, and low voltage. The General Manager will be responsible to the Board for the administration and operation of its electricity undertakings, the co-ordination of the electricity supply systems of the other licensed undertakers and the preparation of schemes for the further development of the electricity supply in the Island.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29521B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (B 433)

AN ASSISTANT ELECTRICAL ENGINEER (age group 25-32) is required by the south-west Lancashire factory of a large industrial organisation. University degree or equivalent qualifications with experience of industrial installations and maintenance of electrical equipment are essential.—Application (in writing), giving full particulars of age, training, and experience, to be addressed to Box No. 2125, Electrical Times. (B 388)

ARMATURE WINDERS and FITTERS. Experienced men required for heavy electrical plant. Excellent earnings and working conditions.—Apply Labour Office, General Electric Co., Ltd., Witton, Birmingham, 6. (A 718)

ASSISTANT ELECTRICAL ENGINEER required by engineering firm. Duties will embrace all aspects of supply and installation of electrical equipment in steel works and glass works. Good theoretical knowledge of d.c. and a.c. motors and automatic control schemes desirable. Permanent progressive position for keen man. Pension scheme.—Apply, stating salary required and brief details of experience, to Stein and Atkinson, Ltd., 25 Wilton Road, Westminster, London S.W.1, endorsed "Electrical Engineer." (B 369)

BRITISH ELECTRICITY AUTHORITY. Combustion Sub-Branch. GENERAL ASSISTANT ENGINEER (Scientist) with a University degree or associate membership of the R.I.C., required in the Generation Operation Branch at Bankside to work on boiler combustion problems. Experience of power station practice will be an advantage. Salary: N.J.B. Grade 5, £537-£744 inclusive.—Forms from D. Moffat, Director of Establishments, British Electricity House, Winsley Street, London W.1, to be returned by November 17, 1952. Quote Ref. AE.297. (B 422)

CAMEROONS DEVELOPMENT CORPORATION require for service in the British Cameroons (Nigeria) an ASSISTANT ELECTRICAL ENGINEER. Candidates should be capable of installing, operating and maintaining power plants as well as local distribution, street lighting and house wiring. Qualifications not less than A.M.I.E.E., and it is essential that candidates should have both practical experience and ability to teach native labour. Age limits 25 to 35 although an older man might be considered for the appointment. Commencing salary according to ability and experience in scale £690 to £1,010. Tours 18-24 months with generous leave on full pay. Outfit allowance £80. Provident Fund contributions 10 per cent employee, 15 per cent Corporation. First-class passages are provided together with free quarters equipped with heavy furniture.—Applications, in writing, giving full particulars, to Rubber and Mining Agencies Ltd., 52 Leadenhall Street, London E.C.3. Only applications from candidates selected for further consideration will be acknowledged. This post is exempt from the requirements of the Notification of Vacancies Order 1952. (B 425)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ELECTRICAL CONTRACTORS operating in all areas of United Kingdom and carrying out all types of electrical installations, invite applications from ENGINEERS and LINESMEN experienced in overhead line survey, design and construction, large factory wiring; Air Ministry and Admiralty cable laying and jointing; refrigeration, radio and television, etc. Men of all grades required. Good prospects and superannuation.—Write, giving full details, age and experience, and salary required to Box No. 2157, Electrical Times. (B 455)

ELECTRICAL ENGINEER required to work under responsible engineer and take charge of, and be responsible for operation and maintenance of the electrical machines and equipment in a large pulp and paper mill. A period of training will be arranged before full responsibility is handed over. Experience of paper or pulp mill work an advantage but not essential. Qualifications must consist of the Higher National Certificate and membership of the Institution of Electrical Engineers.—Apply, in the first instance, to The Chief Engineer, The Bowater Paper Corporation Limited, Northfleet, Kent. (B 426)

ELECTRICAL ENGINEER, young, required as London representative of large electrical contracting organisation. Some technical qualifications essential, and practical experience in transmission and site installations an advantage. An excellent opportunity for rapid promotion for young man with university degree and good connection with engineering consultants and architects in London.—Apply, stating age, experience and qualifications to Box No. 2159, Electrical Times. (B 456)

ENGINEER or PHYSICIST with Higher National Certificate or a degree is required for design work for small quantities of special transformers for experimental apparatus.—Apply, stating age and record, to the Staff Manager (Ref. SS/NB.2), G.E.C. Stanmore Laboratories, The Grove, Stanmore Common, Stanmore, Middlesex. (B 452)

JOHN BRUCE AND PARTNERS, Engineering Consultants, invite applications from MECHANICAL and ELECTRICAL ENGINEERING ASSISTANTS. Applicants should have had experience in the design, layout and site supervision of erection of large high-pressure steam generating installations, large turbo-alternator installations and associated coal and ash handling plant, e.h.t., h.t. and l.t. switchgear and boiler and turbine auxiliary machinery, the design, layout and site supervision of erection of large pipework installations up to the highest pressure and temperature conditions in use today; the design, layout and site supervision of erection of large industrial steam generating and steam utilising installations, including electrical generation by back pressure or pass-out turbo-generators; the design, layout, and site supervision of erection of heating installations for industrial purposes by steam in conjunction with industrial process steam systems or back pressure or pass-out turbines. Applicants must have served a recognised apprenticeship, be prepared to work hard and prepared to work on a drawing board or put on a boiler suit as necessary. The firm does not operate a five-day week and applicants must be prepared to work or travel in the evenings, Saturday afternoon or Sunday if the urgency of work demands it. Location of work, in the first instance, is in London, either on office duties or on site of works, as required. Good salaries will be offered to applicants with the required qualifications. —Applications, in the first instance, should be addressed to Box No. 2141, Electrical Times. (B 437)

JUNIOR ENGINEER, ELECTRICAL, for London office installation and engineering contractors.—Box No. 2135, Electrical Times. (B 423)

LEADING FOREMAN required by medium-sized British company's factory in the Mediterranean area, conditioned by several years' experience in the following: Compression moulding (phenol) of electrical accessories, control of assembly and workshop progress of accessories (lampholders, etc.), brass parts stock control and progressing records. The man required should be preferably single and must be absolutely first rate, for whom salary will be commensurate and air fares covered.—Full details of career and age (rather listed than long descriptions) in complete confidence to Hartley-Emec Ltd., Attention J. C. Stark, 1a Harrington Road, London S.W.7. (B 414)

MANAGER for London Branch of National E.W.F. Wholesaler, with experience and drive to develop large turnover. Previous experience in a similar capacity essential. Salary commission, expenses, pension. —Box No. 2143, Electrical Times. (B 438)

STOREKEEPER for West End electrical contractors; able to check and keep stock.—Write Box No. 2153, Electrical Times. (B 453)

TWO SALES REPRESENTATIVES required. One for the area of the North Western Electricity Board and one for that of the South Eastern Electricity Board. Applicants residing centrally in the area should submit full personal details as to education and experience. Salary £700/800. Pension scheme and good prospects.—Burco Ltd., Rose Grove, Burnley. (B 427)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

SUDAN LIGHT AND POWER CO., LTD. require for service in Khartoum, Anglo-Egyptian Sudan:—

1. FOREMAN CABLE LAYER AND JOINTER. Salary range £E.804 to £E.1,284. Applicants must be of good general education with wide experience in their trade, and be fully competent in the laying and jointing of underground cables; and in the execution of jointing work in power stations and sub-stations on voltages up to 11 kV. Must also be prepared to train Sudanese personnel as part of duties. Experience with 33 kV cable laying and jointing would be an added qualification.

2. FOREMAN OVERHEAD LINESMAN. Salary range £E.804 to £E.1,284. Applicants should be between the ages of 28 and 45, of strong physique with good experience of the construction and maintenance of overhead lines up to 11 kV; and must be prepared to work under arduous conditions. Duties will include the construction and maintenance of overhead lines up to 11 kV; and the training of Sudanese personnel.

3. FOREMAN ELECTRICAL FITTER. Salary range £E.804 to £E.1,284. Applicants should be of good general education; have served a complete apprenticeship with a well-known firm of switchgear manufacturers; and have had at least three years subsequent experience in the installation and maintenance of switchgear and equipment of various types, up to 11 kV. Duties will include the installation and maintenance of power station and sub-station switchgear and transformers on voltages up to 11 kV; and the training of Sudanese personnel. Knowledge of maintenance of electric motors and starters would be an added qualification.

4. FOREMAN WIREMAN. Salary range £E.804 to £E.1,284. Applicants not exceeding 35 years of age must have a thorough knowledge of all forms of power and lighting installation and be fully experienced in the use of heavy gauge conduit. Applicants must also have served at least a five years indentured apprenticeship with a reputable firm of electrical engineers and contractors, and be prepared to assist in the training of Sudanese personnel as part of duties.

Appointments will be on contract for five years with possible extension to periods up to 14 years including a period of 12 months probation, with a bonus payable on completion of the contractual period.

A cost-of-living allowance will be payable in addition to salary. A kit allowance of £E.50 will be payable on appointment.

Free living accommodation with basic furniture or an allowance in lieu thereof and free transport will be provided. After satisfactory completion of the probationary period liberal leave on full salary with free passages.

There is at present no income tax in the Sudan. £E.1—£1 0s. 6d.

Applications stating age, education, qualification, experience (with particulars of posts held), present appointment and salary with names of two references should be submitted to the Secretary, The Power and Traction Finance Co., Ltd., Queens House, Kingsway, London W.C.2. (B 439)

TECHNICAL ENGINEER required to assist in department dealing with the design and operation of power plant projects. Qualifications must include a British university degree in either mechanical engineering or in physics, and any two of the following:—

(a) Practical experience of the operation of large steam-raising and/or power generating plant.

(b) Experience of design of power and steam raising plants in project stages.

(c) Experience in testing of boilers, turbines, cooling towers, dust extraction plant, etc.

(d) Experience in the project design of large instrument and automatic control systems for thermal power plant.

Applications, giving age and full details of experience and qualifications, should be addressed to the Secretary, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (B 424)

WORKS MANAGER required for important factory manufacturing power transformers up to largest capacity and highest voltage.—Applicants should give full personal details, stating experience and salary required to Box No. 2127, Electrical Times. (B 389)

APPOINTMENTS WANTED

CABLE MANUFACTURE. Branch Manager and/or Technical Representative (32), 2 years small branch, requires position, preferably similar. Public School, 4 years Elec./Eng. Studies, O.N.C. Stdd., 6 years Cable Industry, Resident Lancs. Mobile.—Box No. 2149, Electrical Times. (B 448)

ELECTRICAL ENGINEER (27), A.R.T.C.S., H.N.C., heavy and electronics, seeks technical representative. Experience contracting, maintenance and commercial.—Box No. 2129, Electrical Times. (B 392)

MECHANICAL/ELECTRICAL ENGINEER, A.M.I.E.E., aged 49, seeks situation in U.K. Electrical construction and maintenance; operation and maintenance of large diesel-alternator sets; extensive practical mechanical workshop experience.—Box No. 2067, Electrical Times. (B 280)

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FLUORESCENT TUBE refilling specialists require AGENTS in all areas excepting London and Lancs. Must have facilities for the storing and distribution of tubes.—Box No. 2131, Electrical Times. (B 396)

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MOTOR GENERATOR SETS built to customers' requirements from new and/or modern reconditioned machines. Guaranteed for twelve months. Good deliveries, competitive prices.—Enquiries to Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (Ext. 347). (B 402)

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WANTED to buy one ¾ or 1 h.p. INDUCTION MOTOR suitable for 220 V. a.c., preferably fitted with infinitely variable gearbox. Motor speed about 2,000 r.p.m.—Derby Aviation, Ltd., Burnaston, Derby. (B 442)

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DIESEL ALTERNATOR SETS in stock up to 500 kVA, 400/440 V, 3-phase, 50 c/s, 4-wire. Detailed stock list post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel.: 26311 (Ext. 347). (B 403)

DIESEL-DRIVEN GENERATOR SETS. Two 200-kW, ea. incorporating 330-h.p. Crossley vert., 6-cyl., 4-stroke diesel engine. Type XVD6; speed 600 r.p.m.; direct coupled 200-kW, 225 V Crompton Parkinson d.c. generator; compound wound with interpoles. Usual accessories, also heat exchanger for external salt water cooling, air starting equipment and switchboards.

Three 150-kW ea. incorporating 240-h.p. Belliss and Morcom vert., 6-cyl., 4-stroke diesel engine, Type 5A; speed 600 r.p.m.; direct coupled 150-kW 220-230 V G.E.C. d.c. generator, compound wound with interpoles. Standard accessories, also starting equipment, and switchboards.

150-kW, incorporating 240-h.p. National vert., 6-cyl., 4-stroke diesel engine, Type RA.6; speed 600 r.p.m.; direct coupled 150-kW 220-230 V Crompton Parkinson d.c. generator, compound wound with interpoles. Standard accessories, also starting equipment and switchboard.

George Cohen Sons and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (B 411)

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ONE new Sentinel 50-kVA, 400/440 V, 3-phase, diesel-electric ALTERNATOR. Fully equipped. Ready to run. Immediate delivery. £1,850 or near offer.—Crawley Metal Productions, Ltd., Ifield Road, Crawley, Sussex. Crawley 677-8. (B 457)

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A. C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7322. (A 6)

A. C. MOTORS, BRAND NEW. Delivery from stock. Fractional to 200 h.p., 600, 750, 1,000 and 1,500 r.p.m. 400/440 V, 3-phase, 50 c/s, with or without control gear. Also numerous reconditioned a.c. and d.c. motors and other electrical plant. Detailed price stock list post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (Ext. 347). (B 404)

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ELECTRIC MOTORS for sale. 3 h.p., 400 V, 1 ph. 4 Century RS, ¼ h.p., 100-200 V, 8 Singer motors, 1/3 h.p., 190-210 V, 1 ph., 4 light transformer, 230-240 V. Singer sewing machine bench, 3 counter benches, 12 ft. by 31 in.; 8 ft. by 32 in.; 8 ft. by 32 in., with shelves. 4 6-ft. garment rails.—Box No. 2145, Electrical Times. (B 440)

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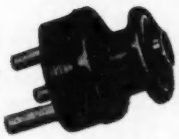

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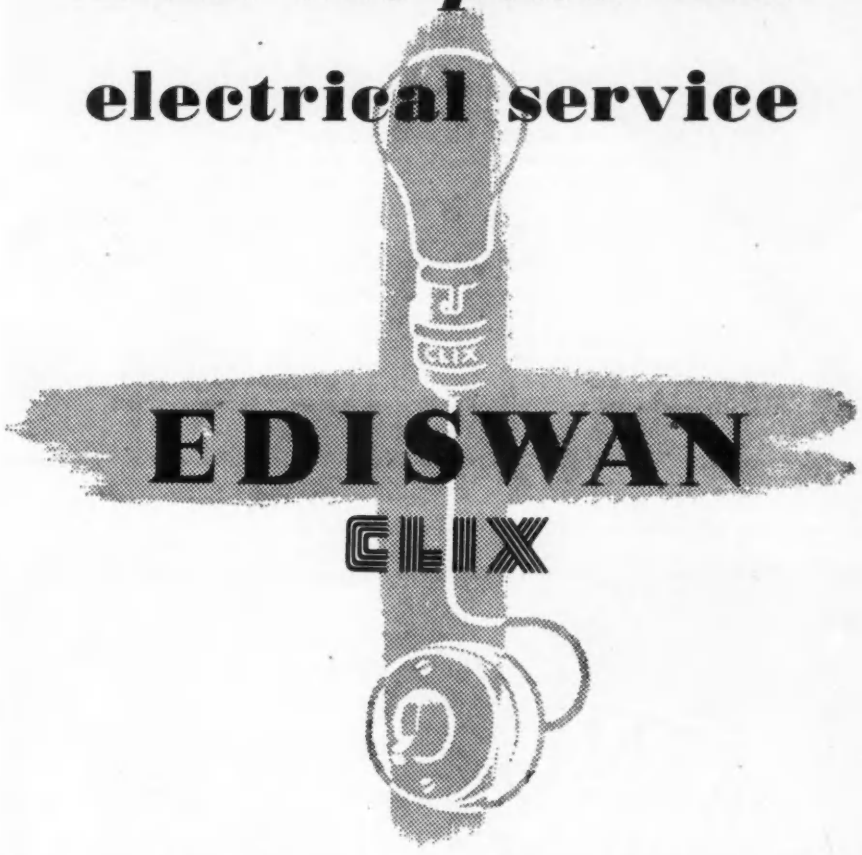

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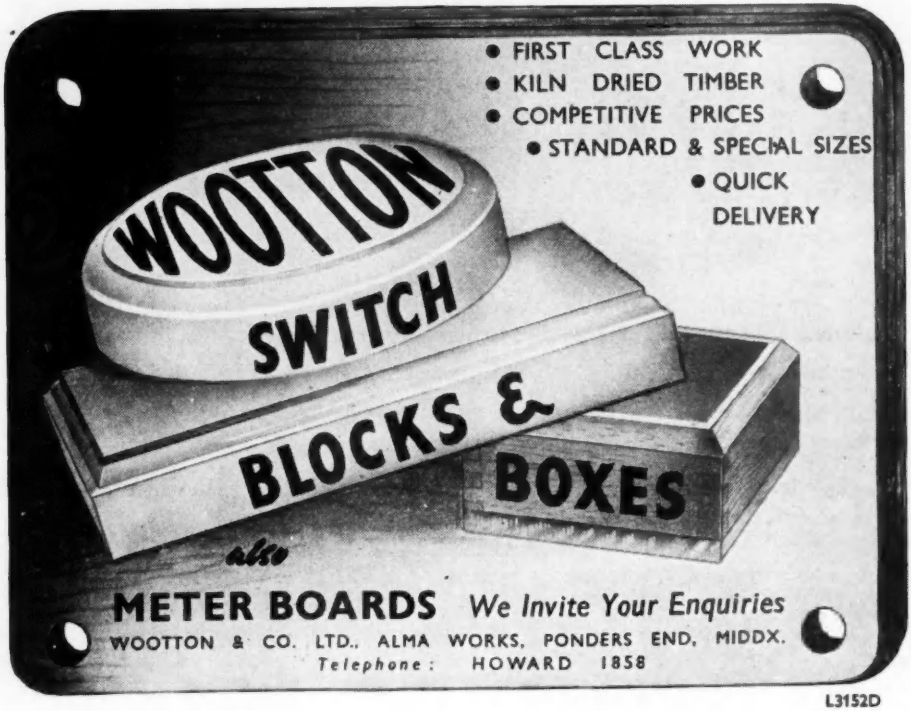

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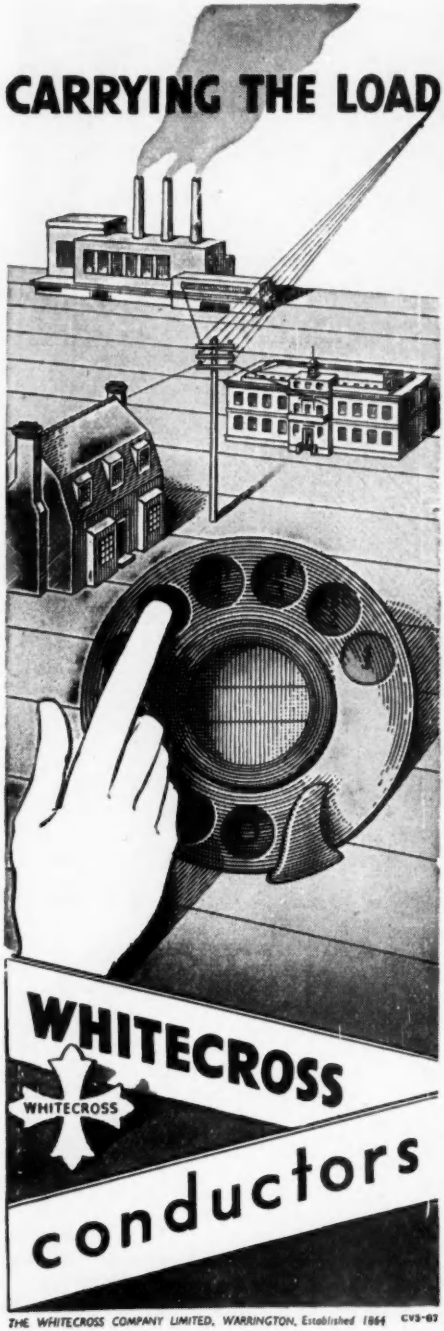

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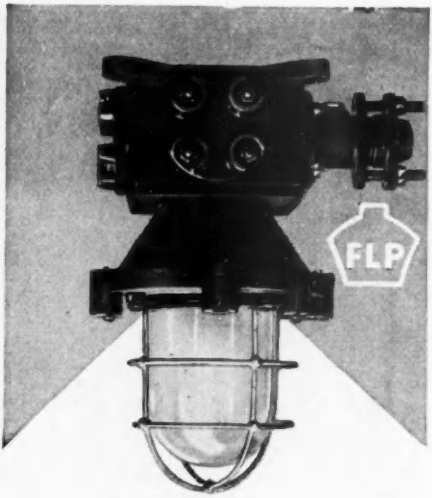

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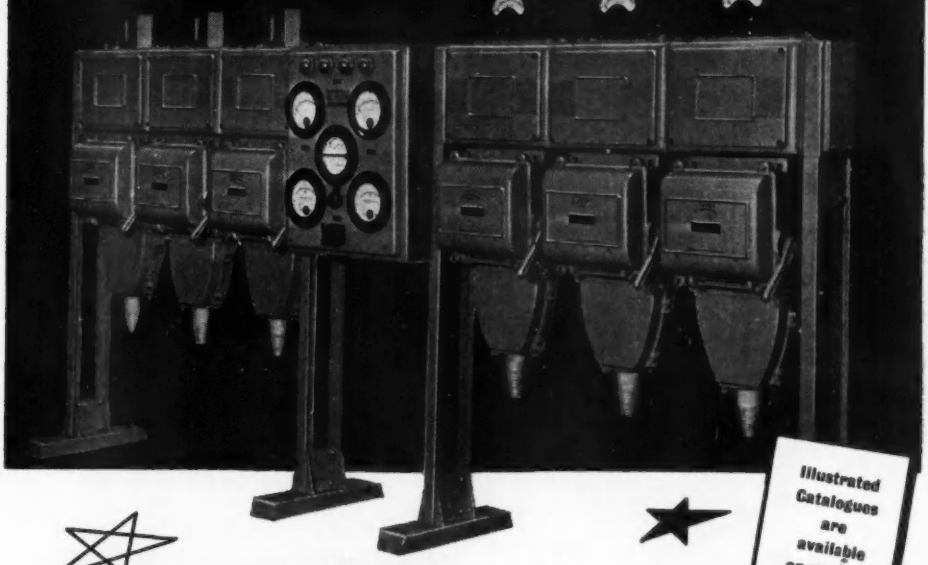

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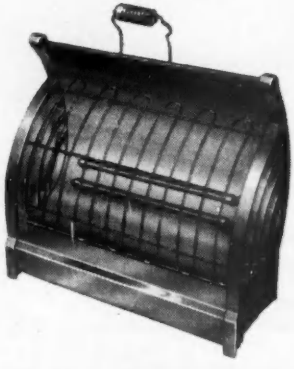

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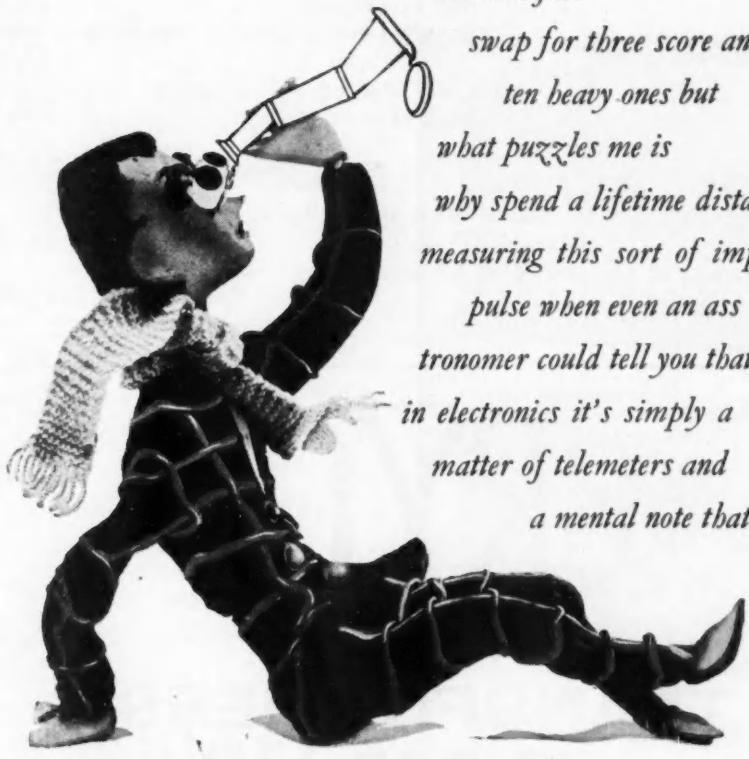

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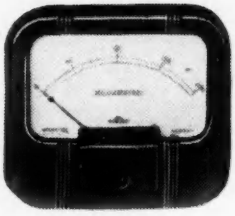

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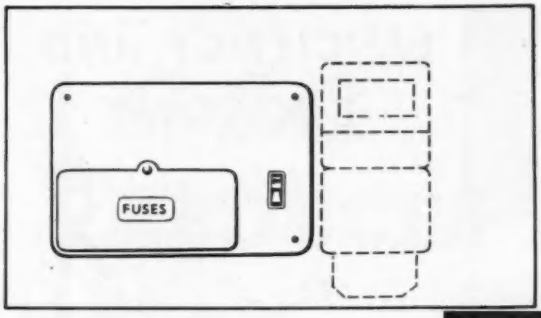

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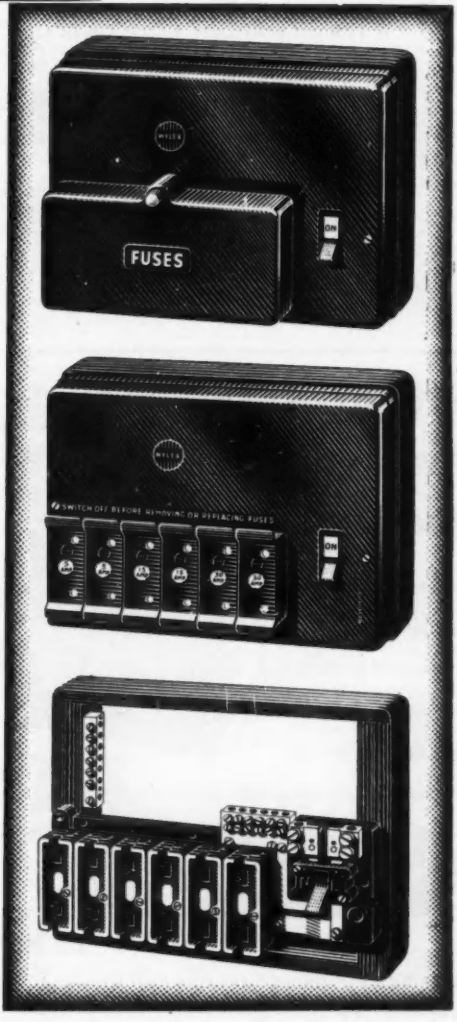

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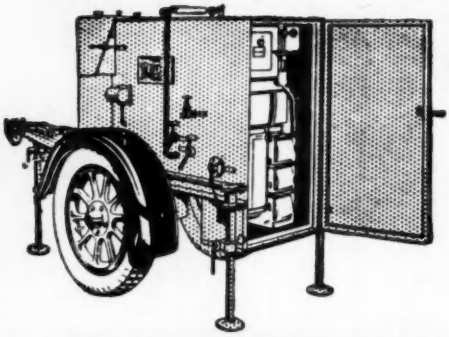

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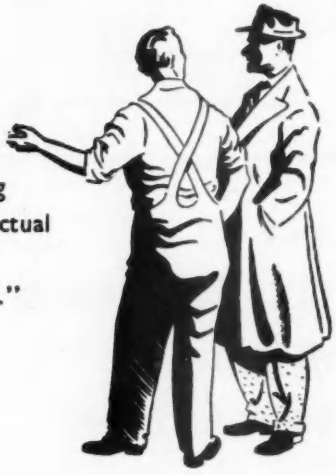

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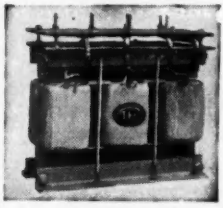

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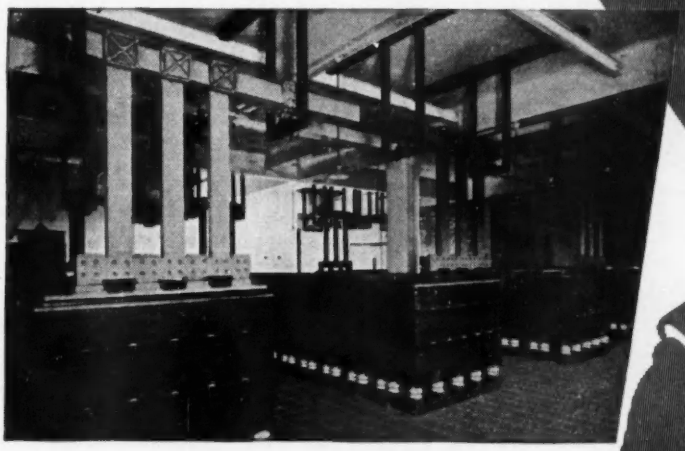

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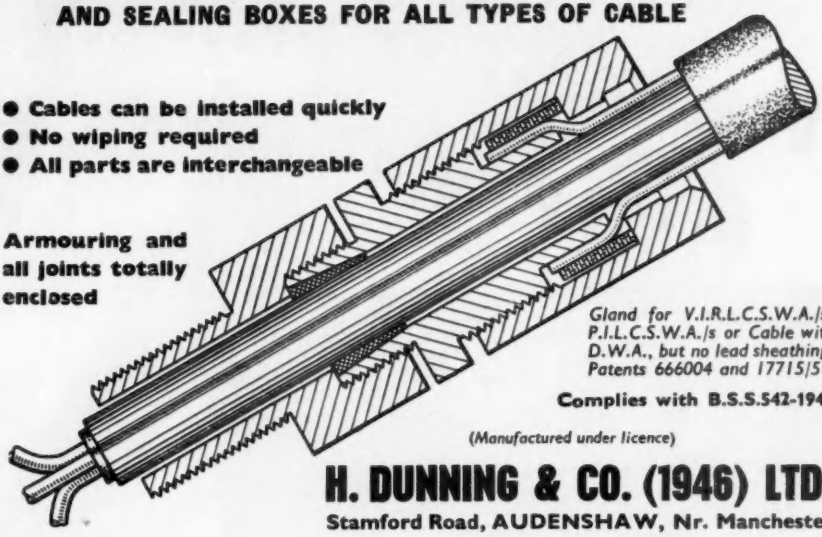

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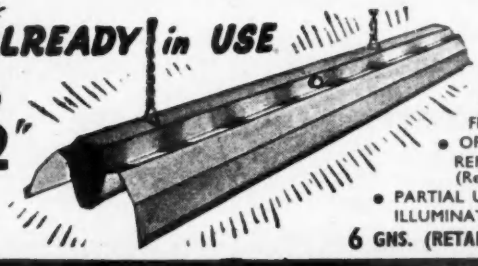

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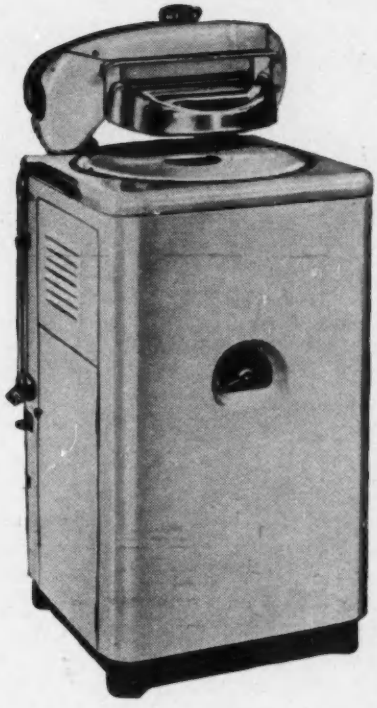

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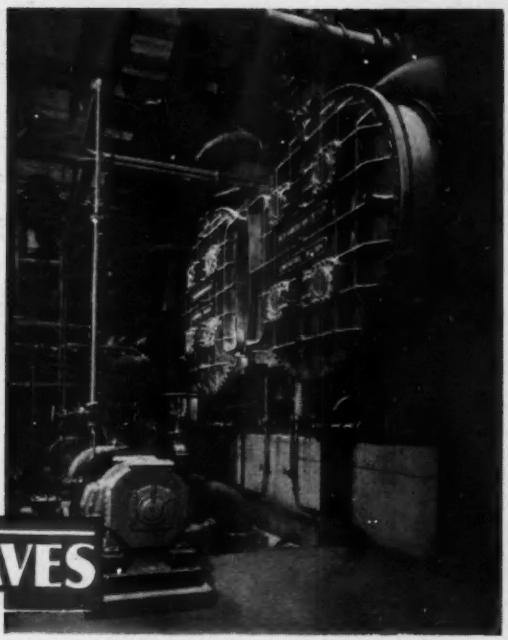

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